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Efficiency and Adequacy in California School Finance: A Professional Judgment Approach

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Submitted to:

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The AIR research team takes sole responsibility for the entire substance and content of this report and operated independently on arriving at any recommendations regarding the costs of adequacy.

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Executive Summary

What is the cost of providing all California public school students with access to the California content standards and to achieve appropriate levels of proficiency standards established by the California Department of Education?

This report presents the results of the professional judgment component of a seven month project undertaken by American Institutes for Research (AIR) to answer the question posed above. The following discussion summarizes the major elements of this “costing out” study. “Costing out” is a term regularly applied to this type of analysis of adequacy in education. In the course of this endeavor, AIR obtained input from professional educators and convened a three-day meeting with highly-qualified California educators to estimate the cost of an “adequate” education.

The Bottom Line

Excluding debt service, public schools in California spent about \$45.29 billion in 2004-05 to educate its students.¹ The main results of this study suggest that an additional \$24.14 to \$32.01 billion would have been necessary in this same school year to ensure the opportunity for all students to meet “academically rigorous content standards and performance standards in all major subject areas.” Across this range of added expenditure, it was found that about 941 districts would have required additional funds to support an adequate educational program for their K-12 students, with this figure rising to 969 when considering the provision of adequate programs for those in preschool. Therefore, our results suggest that only about 15 to 28 of the 984 districts in the state were already spending at “adequate” levels. At first glance, these projected increases in spending of between 53 to 71 percent to achieve adequacy seem staggering. However, we show later California has lagged significantly behind the rest of the nation in spending on K-12 education. Moreover, when compared to the New York Adequacy Study (Chambers et al 2004), the projected spending estimated for California not only falls short of similar projections for New York State, but fails to even equal current spending levels in the Empire State.

Research Methods

The methodological centerpiece for this study is referred to in school finance literature as the “professional judgment” approach. The AIR research team selected highly qualified California educators to serve on professional judgment panels that convened for a three-day meeting to design multiple instructional programs for schools of varying size and demographic composition. These programs were designed so that students would have the full opportunity to meet the outcome goal specified above (i.e. an opportunity for all students to meet “academically rigorous content standards and performance standards in

¹ Analysis of expenditures on debt service to acquire land and build school facilities was beyond the scope of the present study.

all major subject areas” as defined by the state legislature²). These panels were then asked to specify the resources needed to deliver those programs.

Given that these results are derived from only one component of a larger series of studies, we hope that these conclusions will be supported with findings from other studies. These data are supplemented by several other findings including an analysis of staffing patterns and resource allocation in schools identified as “beating the odds” in serving their respective student populations³ and the instructional elements necessary to provide an “adequate” education for English Learners.⁴

Overview of Instructional Program Design Trends

The instructional program designs developed by the PJPs added resources to reduce class sizes, extended the instructional day and year for all students, and added specialists to work with small groups of students and foster professional development opportunities for teachers. The need for high-quality professional development was seen as integral for improving student achievement and retaining quality teachers. Most importantly, panels emphasized that student achievement wasn’t necessarily dependent on the number of personnel staffed at the school level, but how their roles and time were allocated.

The panels also added resources for early education and extended day and year programs, especially for schools with high proportions of students in poverty or with high numbers of English learners. The extended day and year programs were seen as necessary not only for students unable to meet the standards, but also as enrichment opportunities for benchmark students. Early education programs were included to help students, especially those without parental or home support, prepare for school.

Why a Range of Numbers?

The range of numbers presented above reflects the fact that “costing out” educational adequacy is not an exact science. These analyses rely primarily on professional judgments regarding the services needed to achieve the outcome standard specified above. They also rely on assumptions regarding other factors likely to affect overall cost. An important example is the potential change in district administration that might be needed to support the instructional program descriptions derived through professional judgment. These alternative specifications and assumptions and their affect on the overall cost estimate for the state are described in detail in the full report. Reasonable people legitimately can disagree with these assumptions and would arrive at different conclusions using an alternative set. For this reason, full transparency regarding the full set of processes underlying this study, the varying assumptions used, and their effect on cost is essential.

² For a complete statement of the standards around which professional judgment panels were asked to design programs, see Appendix A in the full report.

³ Please see the Beating-the-Odds analysis of the full report submitted by AIR.

⁴ A study examining the resource needs for California’s English Learners is being presented by Patricia Gandara and Russell Rumberger as part of the “Getting Down to Facts” series.

The Professional Judgment Process

The initial stages of this project were devoted to developing a series of tasks to guide panelists in their deliberations. The AIR research team used benchmarks for student outcomes outlined in current legislation⁵ and solicited input from state education experts as to the criteria that should be used to define adequacy. This culminated in the subsequent *Goals Statement* used to define adequacy for the purposes of the study:

Exhibit 2-2 - Goals Statement

Background

The federal No Child Left Behind Act and state law requires that *all* students in every school district meet “academically rigorous content standards and performance standards in all major subject areas” by the 2013-2014 school year and to make steady progress toward that goal each year {*Cal. Educ. Code 60602(a)(2)*}.

(1) Access to California Content Standards

All students should have access to instructional programs and services that are consistent with the California content standards in all subject areas, listed below, as adopted by the State Board of Education.

- **English language arts** standards direct children in learning to understand written and oral language expression, to communicate effectively, to comprehend and appreciate a diversity of literature, and to comprehend various sources of information.
- **Math** standards are designed to prepare students to grapple with solving problems; develop abstract, analytic thinking skills; learn to deal effectively and comfortably with variables and equations; and use mathematical notation effectively to model situations.
- **History-social science** standards emphasize historical narrative, highlight the roles of significant individuals throughout history, and convey the rights and obligations of citizenship.
- **Science** standards are viewed as the foundation for understanding technology and societal issues. These issues are strongly connected to community health, population, natural resources, environmental quality, natural and human-induced hazards, and other global challenges.
- **Visual and performance arts** standards represent a strong consensus on the skills, knowledge and abilities in dance, music, theatre and the visual arts that students should be able to master at specific grade levels.
- **English language development** standards define what all students, including those learning a second language, are expected to be able to know and do. These standards are designed to supplement the ELA content standards to ensure that limited English-proficient (LEP) students develop proficiency in both the English language and the concepts and skills contained in the ELA content standards.
- **Physical education** standards are based on the premise that the quality and productivity of each individual’s life can be enhanced through participation in a comprehensive, sequential physical education system that promotes physical, mental, emotional, and social well-being.

⁵ See California Education Code 60602(a)(2).

Exhibit 2-2 - Goals Statement (continued)**(2) Target Performance Levels for California Public Schools**

As of the 2005-06 school year, all California high school students (except for certain students with disabilities) will be required to achieve a passing score on the California High School Exit Examinations (CAHSEE) in English language arts and mathematics to receive a high school diploma. As of the 2005-06 school year, students in grades 3-8 will be tested in English and mathematics (and shortly thereafter in science) to determine whether they are making satisfactory progress toward meeting the learning standards. Rates of yearly progress toward these goals must be disaggregated by racial, economic, disability and limited English proficiency subgroups. The target outcomes for deliberations of the professional judgment panels should be directed toward those established by the California Department of Education for the 2011-2012 school year as follows:

- **Participation rates** of 95% school-wide and for each subgroup.
- **English-language arts proficiency rates** of 78.4% for elementary and middle schools and 77.8% for high schools.
- **Mathematics proficiency rates** of 79.0% for elementary and middle schools and 77.4% for high schools.
- **An Academic Performance Index (API)** of 740 in every elementary, middle, and high school (an API target of 800 will be addressed in a later task).
- **A high school graduation rate** of 83.4%.

In addition, the research team consulted specialists on English learner and special education populations to help develop specific instruction sets focused on designing educational programs for schools with high percentages of these populations.

Next, the AIR team developed a process for selecting “highly qualified” educators to serve on two independent professional judgment panels (PJPs). These two panels were organized to develop instructional program designs and specify the resources necessary to deliver those programs in order to achieve school finance adequacy for students attending California schools with “typical” demographic compositions. These panels were then asked to modify their original instructional programs for schools with varying levels of students living in poverty, classified as English language learners (ELLs), enrolled in special education, and attending schools of varying sizes.

Based on the PJP deliberations, we developed estimates of the costs of an adequate education for California public schools across various levels, sizes, and demographic configurations. In general, the analysis of school program costs derived from the work of the PJPs show higher per-pupil costs for schools with greater numbers of impoverished, ELL or special education students.

Central Administration, Maintenance and Operations Costs

In order to compare the total program costs derived from the PJP process with current spending in the state, it was necessary to add cost estimates of district-level functions such as central administration, maintenance and operations, and transportation, which were not included in the PJP process. Two methods were used to calculate these district-level costs. The first more conservative method simply uses current spending on these district-level functions. The more liberal alternative approach assumes that spending on at least some district-level functions will change proportionally with changes in the

school-level instructional program spending.⁶ The average of two alternative approaches that provided the lower and upper bound cost estimates was used to estimate district level expenditures. While more precise analysis of district-level functions is beyond the scope of this study, it was felt that these parameters provide reasonable bounds for considering administrative costs within this context.

The Results

Adequate Per-pupil Cost Estimates by Locale

Exhibit 4-2 compares the AIR projected per-pupil expenditures derived from the program specifications designed by the Blue and Gold PJPs to the actual per-pupil expenditures reported in the SACS fiscal files supplied by the CDE.⁷ These figures are pupil-weighted so that they represent per-pupil expenditures for the district attended by the average student within each of four district categories. In addition to the overall statewide average, average per-pupil expenditures within different types of districts provided. The district categories include urban, suburban, towns and rural districts.⁸

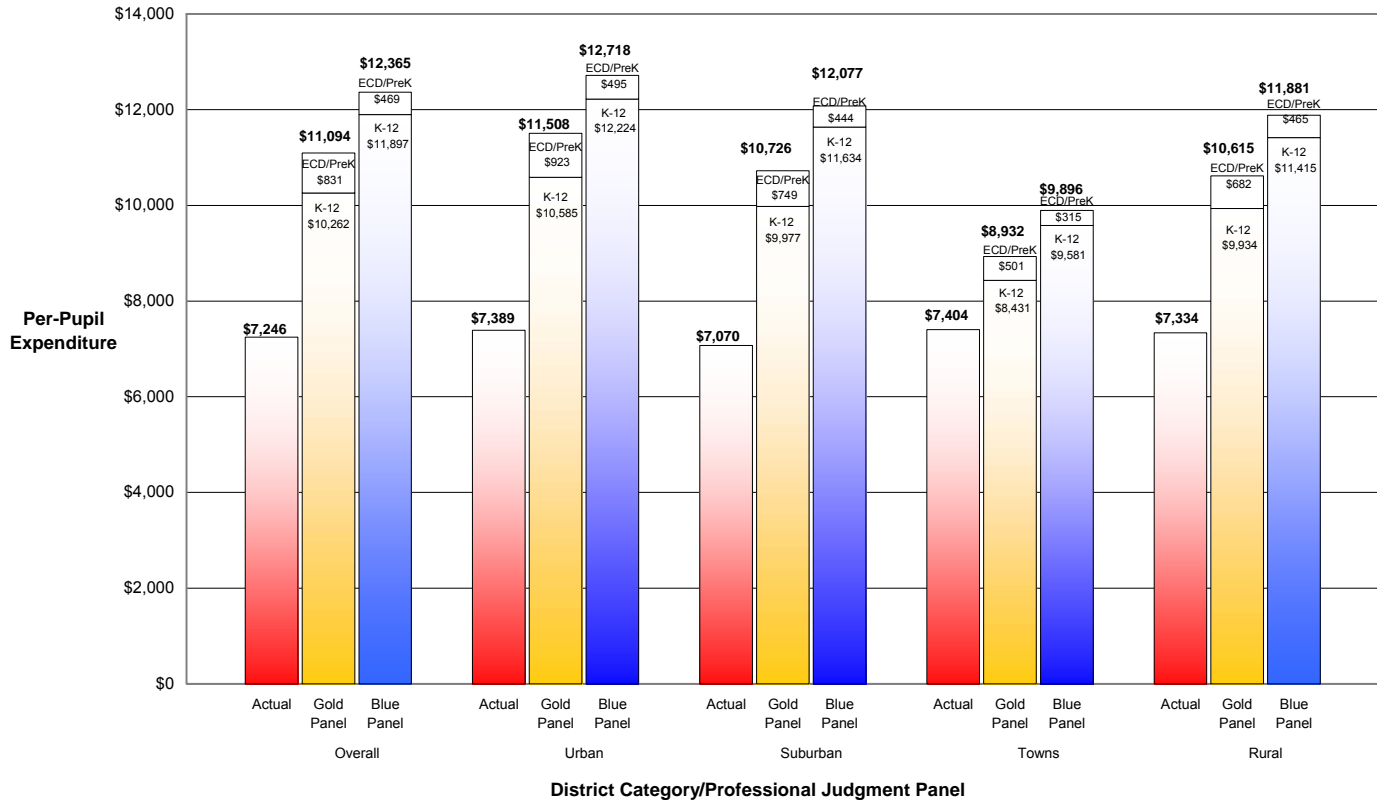
The exhibit shows that the statewide average “adequate” per-pupil expenditures for the 2004-05 school year range from \$11,094 to \$12,365, which represents a 53 to 71 percent increase over what was actually spent that year (\$7,246). However, it is important to recognize that the figures show large variation across the four district categories defined above. The results suggest that students in urban districts require the highest per-pupil expenditure (from \$11,508 to \$12,718) to provide an adequate education, while necessary per-pupil expenditures (\$8,932 to 9,414) are lowest for districts that lie in towns. Nevertheless, it must be noted that the suggested ranges of adequate per-pupil expenditures for both district types are well above what was actually spent. The implied increase in per-pupil expenditure that is required for urban districts to achieve adequacy ranges from \$4,119 to \$5,329 (56 to 72 percent, respectively), while for town districts this range is \$1,528 to \$2,492 (21 to 34 percent, respectively).

⁶ With this method we assumed that district-level expenditures for central district administration and maintenance and operations increase commensurately with school-level instructional program, while expenditures on transportation was preserved at current levels.

⁷ It is understood that both projected and actual (current) expenditures refer to 2004-05 dollars, which corresponds to the year of the most recent SACS fiscal data available for use in this study.

⁸ These classifications of districts into urban, suburban and rural are based on the locale codes used by the National Center for Education Statistics (NCES) and published in their Common Core of Data (CCD). Specifically, the eight NCES locale codes have been combined into four locale categories as follows: Urban contains large and small cities (codes 1 and 2); Suburban includes urban fringe of large and mid-size cities (codes 3 and 4); Towns contain large and small towns (codes 5 and 6); and, Rural includes rural areas (codes 7 and 8).

Exhibit 4-2 - Comparison of Adequate Versus Actual Per Pupil Expenditures by District Type and Professional Judgment Panel (Overall Expenditure on PreK and K-12 in Bold)

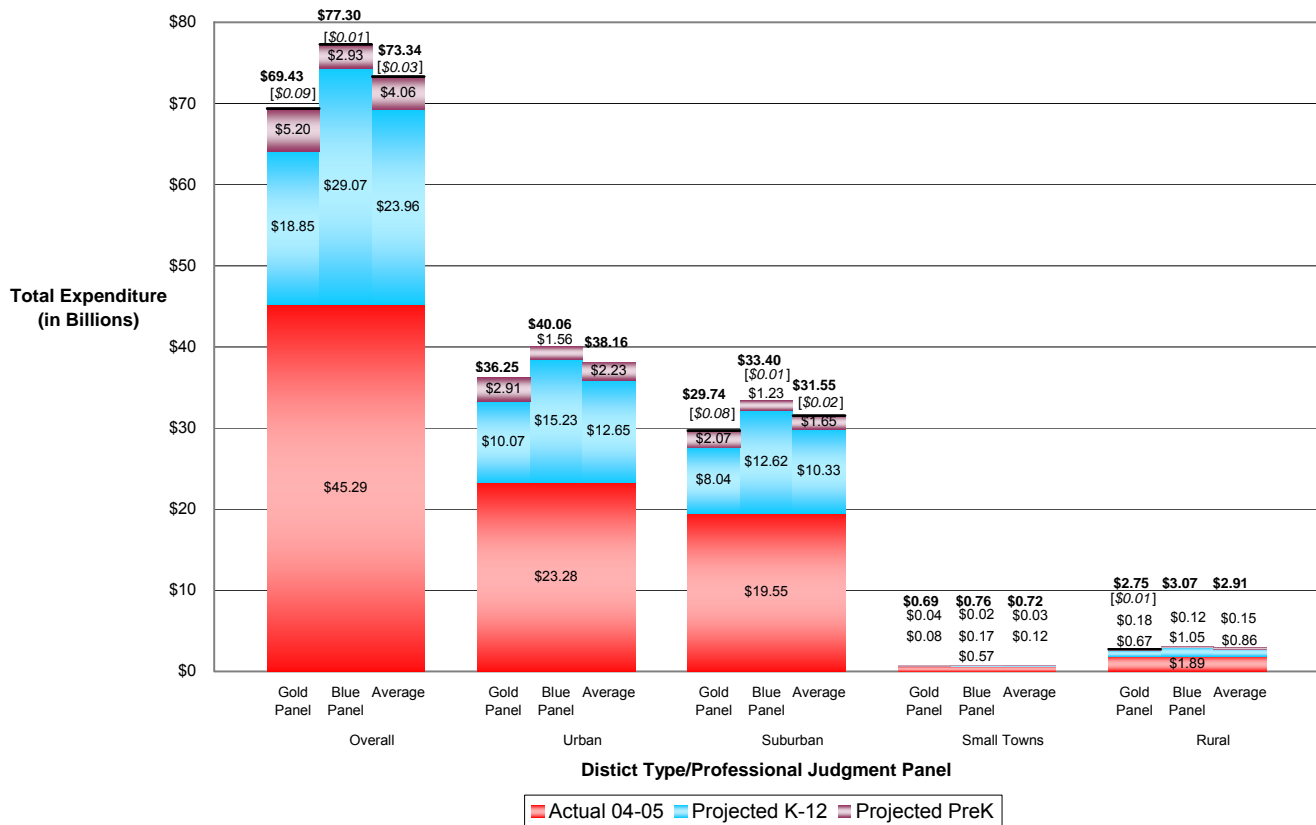


Total Cost Estimates

Based on the PJP specifications, in order to provide all students a “full opportunity” to meet the current standards and desired outcome levels, California would have had to spend an additional \$24.14 and \$32.01 billion in 2004-05 (see Exhibit 4-3) on districts not spending at “adequate” levels, while holding expenditures constant for districts that were spending at or above an “adequate” level.⁹ This represents an increase of 53 to 71 percent over the actual spending levels of \$45.29 billion in that same year.

⁹ We have preserved the numbering of the exhibits in the Executive Summary to reflect those found in the main body of the full report.

Exhibit 4-3 - Total Expenditure Required to Provide "Adequate" Levels of Spending by District Type and Professional Judgment Panel Specification (Total Expenditure in Bold, Hold Harmless in Brackets)



A Comparison with New York

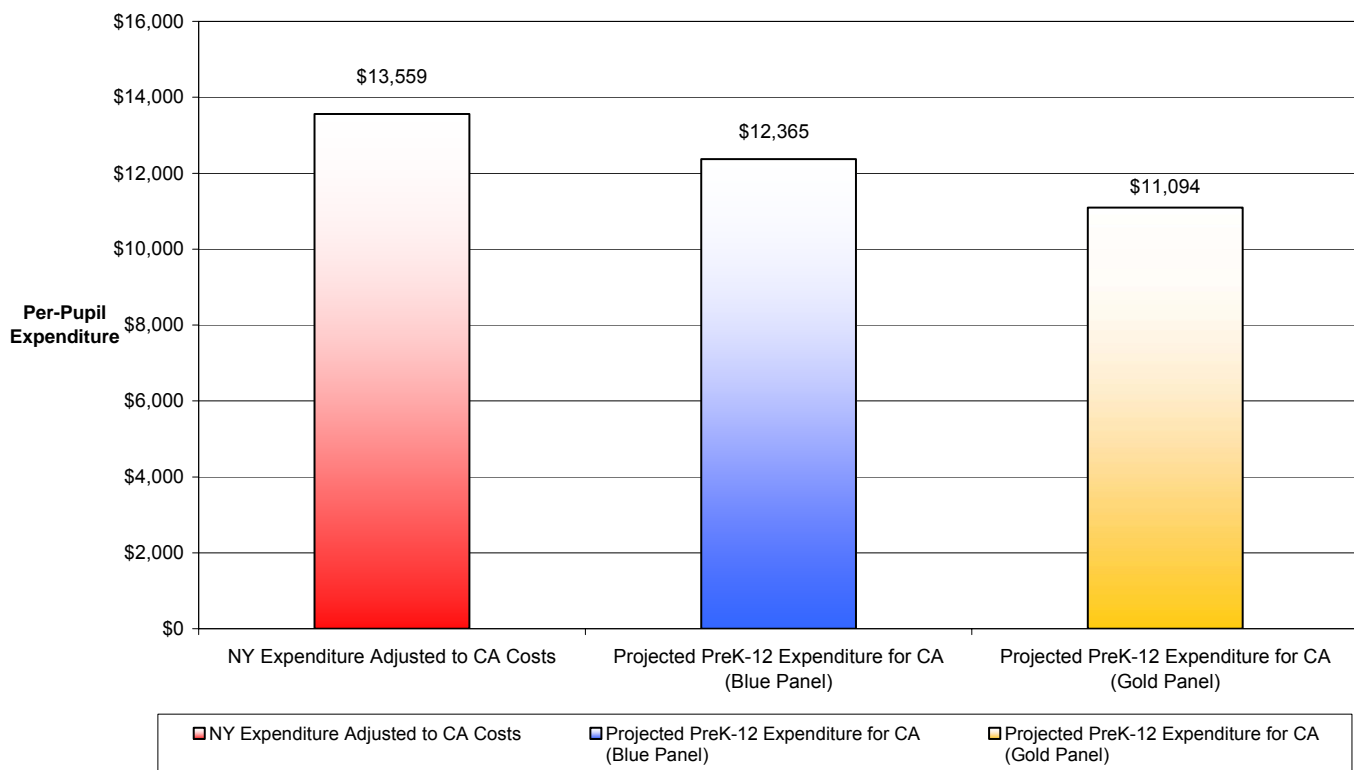
At first glance, the projected costs for California seem extraordinary. However, if one takes into account the condition of California school finance for the past couple of decades and its current position when considering the question of school finance adequacy, these projections may not seem so far out of line. Recent data published by the Census Bureau show that actual California school spending ranks 25th, but when adjusted for geographic cost differences across the U.S., California ranks 44th among the 50 states in per-pupil spending on education.¹⁰ In fiscal year 2003, New York State spent \$12,140 per pupil in comparison to actual spending in California of \$7,691.

However, even more significant is a comparison of these projections in Exhibit 4-2 against comparable projections with a similar study conducted by Chambers et al (2004) in New York State. Exhibit 4-6 presents this comparison. The New York figure

¹⁰ See Table 8 in Public Education Finances, 2003 (<http://ftp2.census.gov/govs/school/03f33pub.pdf>) published by the Census Bureau in 2005 and <http://www.bcny.org/whatsnew/2005/0317schoolspend.htm>. To obtain geographic cost adjusted spending, we used the comparable wage index developed by Dr. Lori Taylor for the National Center for Education Statistics and adjusted actual spending for the variations in labor costs across the states.

represents the average per-pupil expenditure necessary to provide an adequate education in New York State school districts. The figures presented in this exhibit for New York have been adjusted for inflation (to 2004-05 dollars) using the Employment Cost Index for education personnel from the U.S. Bureau of Labor Statistics combined with a rough adjustment to account for geographic differences in the cost of education between New York and California taken from Taylor (2006). The projected per pupil spending figure for New York State (\$13,559) represents a 17 percent increase over actual average per-pupil expenditure for New York State which is already a relatively high spending state.¹¹

Exhibit 4-6 - Comparison of Projected Per-Pupil Expenditures from New York and California Adequacy Studies



While the California cost projections appear high relative to current spending levels in California, they are still lower than the projections for achieving adequacy in New York State. Indeed, the New York projections are about 10 to 22 percent higher than those for the California Blue and Gold panels, respectively. In fact, the higher of the two

¹¹ Exhibit 4-1 (p, 74) of the final report for the New York Adequacy study (see Chambers et al, 2004) shows a projected per pupil expenditure for 2001-02 of \$12,975 which is 17.4 percent higher than the actual per pupil spending of \$11,056 for the same year. The \$13,559 figure presented in Exhibit 4-6 in the body of this report represents the inflation adjusted estimate of the original projection for New York State of \$12,975. Adjusting the \$11,056 for inflation, the actual per pupil spending in New York for the 2004-05 school year would have been \$11,554.

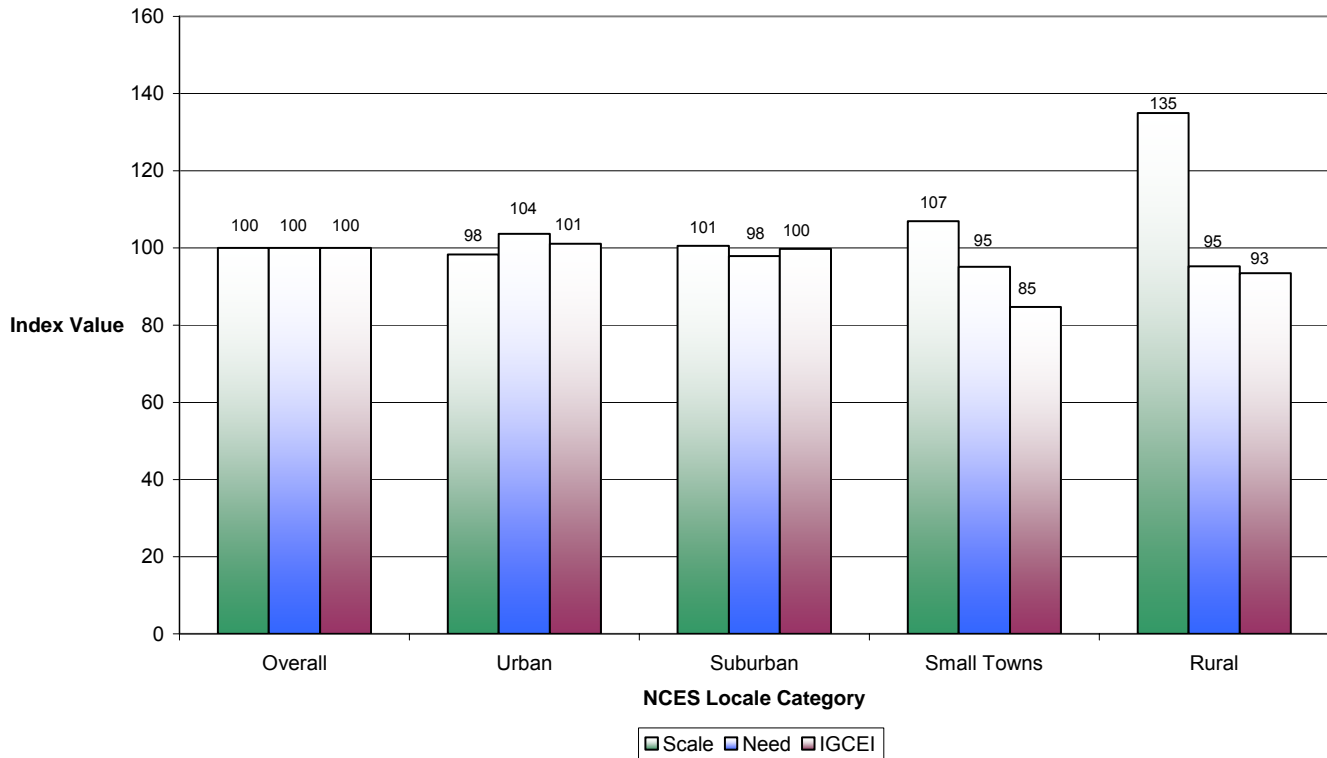
California projections is just above the actual public school spending per pupil in New York State for the 2002-03 school year which amounted to \$12,140. While such comparisons can be criticized on a number of grounds, they do provide a somewhat different benchmark against which to judge the work of the California PJPs. The outcome standard used by the PJPs in New York was that “all students have a full opportunity to meet the Regents Learning Standards and to earn a Regents Diploma” (see Chambers et al, 2004, page 17, Exhibit 2-1). In this study, the PJPs were asked to develop their projections based on the California content and proficiency standards which have been argued by some to be comparable to New York.¹²

Patterns of Cost Differences

As shown in Exhibit 4-12, geographic cost variations, the scale of district operations, and differences in pupil need all play distinct roles in accounting for variations in the estimated cost of achieving adequacy. Analysis of the variations in the patterns of scale and need revealed that the urban districts tended to exhibit relatively higher projected expenditures based on pupil needs and relatively lower projected expenditures associated with scale of operations, all else equal. Also note that there is a consistent pattern of higher relative costs associated with the scale more rural districts and, to a lesser extent, small towns that are consistent with diseconomies of scale these districts often face due to small enrollments.

¹² The Fordham Foundation evaluated the quality of state standards and their “evaluators rated California standards as the best in the nation.” (p. 10, Rose et al, 2003). Peterson and Hess ranked the rigor of state assessment standards and assigned an overall grade of B- to California and C for New York (see Peterson and Hess, (2006)). The latest Education Week report *Quality Counts* (2006) gave California an overall rating of B+ (score equals 89) for its standards and accountability, however, for the standards and school accountability it received scores of 40 (out of 40) and 27 (out of 30) points, respectively. Unfortunately, the overall standards and accountability rating suffered because the state does not offer elementary social studies assessments that are aligned with state standards.

Exhibit 4-12 - Implicit Geographic Cost of Education (GCEI) and Relative Needs/Scale Indices by NCES Locale Category



A Cautionary Note

Also, although the professional judgment panels derived instructional designs by which schools could construct an adequate opportunity to meet the California content standards and proficiency levels, this theoretical design does not include, or recommend, that the specific components of these models become mandates for local practice. However insightful the instructional designs created by these panels or persuasive the case for their effectiveness, the intention of this exercise was not to create a “one-size-fits-all” prescription of best educational practice. Rather, the model lends a justifiable systematic process with which to determine necessary expenditures to provide an adequate education across a wide range of circumstances (i.e., needs and scale of operations). Harnessing creativity and commitment, and taking advantage of the experience of local educators, necessitates providing them with discretion to determine exactly how funds should be used coupled with an effective accountability system and governance structure within which to operate.

Concluding Remarks

While the projected additional expenditures necessary to bring all districts up to spending levels capable of providing an adequate education may seem high (i.e., an additional \$24.14 to \$30.01 billion in 2004-05), it is important to keep in mind the adequacy goal benchmark that the PJPs were provided with in order to develop their instructional programs and resources necessary to provide these programs. The goals statement put to the PJP is based on standards set by the California State Board of Education. As of 2006, these standards were rated amongst the highest in the nation by the Education Week's annual report *Quality Counts*. Given the current levels of performance of California public schools and the high expectations that the state has set forth, the large adequacy-projected dollar figures perhaps should not be not all that surprising. The main point suggested by these results is that we must be realistic about the demands we place on our public education system and weigh these against our willingness and ability to pay for them.

Chapter 1 - Introduction and Overview

What is the cost of providing all California public school students with (1) access to instructional programs consistent with the California content standards and (2) the opportunity to achieve proficiency standards established by the California State Board of Education?

This report presents the results of a seven-month effort by the American Institutes for Research (AIR) to answer this question and thereby determine the cost of an “adequate” education for all public school students in the State of California. It is a report using what is often referred to in the school finance literature as a “costing-out” analysis.

In the course of this endeavor, the AIR team combined information from publicly available data with materials reflecting the input of a variety of constituencies to specify the goals and objectives of the educational system, and used a professional judgment model to carry out the costing-out exercise. Two highly qualified panels of professional educators from California public schools designed instructional programs and allocated resources in order to develop a range of estimates of what it might cost to “adequately” fund the public schools in the state.

It is important to point out that this study is not intended as a comprehensive application of the professional judgment model. A more comprehensive application would have included an extensive public engagement component to develop the goals of the public school system, a number of general and specialized professional judgment panels, and a group of stakeholders that would review the work of and provide feedback to the panels. Resources for the present study were simply not sufficient to permit us to engage in this kind of comprehensive approach. Nevertheless, we do believe this limited application of the professional judgment model can provide some valuable perspectives on what this process has to offer, and it will provide some cost estimates that may be compared with alternative costing-out models that are being applied by other researchers as part of the larger “Getting Down to Facts” project funded through Stanford University by the Hewlett, Gates, Irvine, and Stuart Foundations.

This study builds cost estimates based on a process that requires professional educators to think systematically about the program designs that might legitimately be expected to achieve the desired goals and then requires them to specify the resources necessary to deliver those programs to public school students throughout the state. The state-of-the-art in education research is simply not far enough advanced to provide a precise answer to the question of education adequacy. Even those concepts that we purport to measure (i.e., student achievement test scores) can be argued to reflect a limited view of what schools should offer their students. While we do not have precise answers regarding the priorities the public places on various potential outcomes of schooling, we are gaining an understanding of what combinations of inputs would be necessary to produce any given

set of outcomes. However, we still don't have a very strong sense of how to measure some of the inputs (e.g., teacher quality).¹³

Overview of the Results

With a combination of federal, state and local sources of revenue, it is estimated that the public schools in California spent a total of \$45.29 billion in the 2004-05 school year to educate its students (henceforth referred to as 'total current expenditure').¹⁴ The estimates developed in this study suggest that the costs of an adequate education in California will require an additional investment of somewhere between \$24.14 and \$32.01 billion which represent a stunning increase in spending of between 53 to more than 70 percent.

At first glance these projected increases seem staggering and hard to comprehend. However, it is important to recognize that per pupil spending on public schools in California has lagged well behind spending levels in most other states for almost two decades (Carroll, Krop, Arkes, Morrison, and Flanagan (2005)). Moreover, we later show through comparisons with per pupil spending figures based on an adequacy study conducted of public schools in New York State, a state that has established learning standards that are comparable if not slightly lower than those in California, that the per pupil spending levels to achieve adequacy in California schools are actually lower than similar projections and even actual spending levels in New York State (see Chapter 4 of this report).¹⁵

It is important to understand how to interpret these California adequacy cost estimates. The range of cost estimates reflects the amount of funds needed to bring all districts not currently spending at levels deemed adequate by this analysis up to a level to provide all students the opportunity to meet the California content standards and achieve targeted California proficiency levels. The analyses contained in this report suggest that there are only a handful of districts currently spending at projected adequate levels. More precisely, the results indicate that between 885 and 963 out of the total of 984 California school districts included in the analysis are currently spending below levels deemed necessary to support an adequate education in grades K-12.¹⁶ The number of districts spending at less than adequate levels increases to between 937 and 976 when considering what would be necessary to also provide for early childhood development and PreK programs.

¹³ For a well written description of some of these issues, the authors recommend Rothstein (2004).

¹⁴ Note that this figure excludes certain expenditures made by county offices of education. The present study also excludes any analysis of expenditures on debt service to acquire land and build school facilities. While we acknowledge this component as important, a detailed analysis of these expenditures is simply beyond the scope of the present study.

¹⁵ The reader is referred to (Chambers, J., T. Parrish, J. Levin, J. Guthrie, J. Smith, and R. Seder. 2004) for the New York Adequacy Study and see (Peterson and Hess, 2006) for an analysis of state performance standards.

¹⁶ These estimates include all unified, elementary, and high school districts, as well as a small number of charter school districts in the state.

By implication, there are some districts in California that are already spending at adequate levels. This is not to claim that these districts spend “too much” money, as there may be other factors or considerations beyond the scope of the study justifying these spending levels. Examination of these districts should be conducted by the appropriate policy making bodies and decisions should be made by local school boards, citizens and state legislators.

As mentioned, the foundation for these estimates is based on the recommendations of two professional judgment panels (PJPs) of highly qualified educators. In general, the instructional program designs developed by the PJPs added resources to reduce class sizes, extended the instructional day and year for all students, added specialists to work with small groups of students, and increased opportunities for professional development of teachers. The need for high-quality professional development was seen as integral for improving student achievement and retaining quality teachers. Most importantly, panels emphasized that student achievement wasn’t necessarily dependent on the number of personnel staffed at the school level, but how their roles and time were allocated.

The panels added resources for early education and extended day and year programs, especially for schools with high proportions of students in poverty or with high numbers of English Learners. The extended time (day and year) programs were seen as necessary not only for students unable to meet the standards, but also as enrichment opportunities for students already proficient in the content standards and outcome measures. Early childhood and preschool education programs were included to help students, especially those without parental or home support, prepare for school. Throughout this study, the AIR research team has attempted to maintain transparency by identifying underlying assumptions. We acknowledge that individuals can legitimately disagree with these assumptions and could arrive at different estimates using an alternative set of assumptions. It is our hope that this transparency will allow readers to make their own assessment of what assumptions or foundations they are willing to accept and establish what they regard as a reasonable estimate of the cost of achieving the established goals.

Funding “Adequacy” in the Context of California

In the last two decades there has been a nationwide shift in the responsibility for school funding. Traditionally, schools were funded for the most part by local taxes, supplemented by state funding, with the smallest share of funds coming from the federal level. Nationwide, there recently has been an increase in proportion of funds coming from state along with decreasing local responsibility in school funding. In addition, the share of federal revenues has decreased slightly.

While California has in fact followed this national trend, the experience has been far more pronounced. While the federal share of total California revenues has for the most part followed that of the nation, the proportion of education funding coming from state and local revenues have differed dramatically. When compared to its counterparts, California public schools receive a significantly higher proportion of school funds coming from the state.

The trends in California school finance have been significantly influenced by the *Serrano v. Priest* court case and subsequent passage by the state’s votes of property tax limitation measure, Proposition 13, which effectively limited the amount of local tax revenue that could be collected by capping property tax rates. The end result was a major shift of support for school finance from local to state revenue sources or, as stated in Downes (1992):

“The primary effect of *Serrano II* and Proposition 13 was thus to create what was effectively a state-financed system of public education.”

With the growing role of the state, the focus of the funding debate in this new era of school finance turned to equity or, more precisely, to what the school finance literature referred to as *horizontal equity*. Under this concept, students and taxpayers across districts should be treated similarly with respect to the resources they receive and taxes they are required to pay, respectively (see Coons et al (1970)). Unfortunately, an unintended consequence of the Court’s ruling was that funding was to be equalized *down* where, rather than providing general aid to poorer districts at the level enjoyed by more affluent districts, spending limits were imposed at a level between the two. That is, while poorer districts had their levels of general aid increased, many less needy districts witnessed dramatic decreases in the amount of general aid they received.

With this focus on equity, the debate surrounding what constitutes an adequate education has, until now, been slow to enter the public arena. While the levels of general aid to poorer districts have in fact increased, the question surrounding adequacy still remains: Are current funding levels sufficient to allow the opportunity for all students to achieve state content standards and proficiency levels?

Standards as a Means to Determine “Adequate” Resources

Often the clauses found in state constitutions provide vague descriptions as to the exact definition of an adequate education. For instance, the term “thorough and efficient” was introduced in 1857 in Minnesota, in 1872 in West Virginia, and in 1947 in New Jersey to describe the state obligations in providing public education to its citizenry. The interpretation of such constitutional obligations will drive the determination of what resources are necessary to provide educational adequacy. Therefore, before one can begin to address the issue of cost, it is essential to have a well-defined objective of the public education system that includes measurable outcomes that must be attained.

While formal concrete statements stemming from constitutional adequacy clauses are not readily available across all states, two factors have helped push the establishment of these goals statements. First, the recent wave of court cases has revealed the need for states to operationalize their goals for public education. For example, a significant focus of the DeRolph case in Ohio was about defining the concept of “thorough and efficient” and how it relates to adequacy in school funding.¹⁷ A recent court case in New York sought

¹⁷ See McKinley (2005a, b) for a full discussion.

to define the concept of a “sound basic education” and to determine the cost of providing this opportunity to all children in New York public schools.¹⁸

Second, the federal No Child Left Behind (NCLB) act has forced all states to design standards-based accountability systems that provide a foundation for what appropriate goals are with respect to *academic achievement*. However, it must be noted that academic achievement is not the sole or, arguably, most important basis upon which the performance of school systems should be evaluated. In terms of education standards in the state of the California, not only has the state legislature outlined targeted outcome proficiency measures, they have also introduced a diverse set of content standards that they expect students to access.

Once an educational goal is established, the important issues of determining the cost of an adequate education and developing a system of resource distribution that ensures all districts can provide adequate educational services to their children must be addressed. The professional judgment model is one method that can be employed in order to determine the cost of an adequate education.

Research Methods

The methodological centerpiece for this study is the “professional judgment” model. The AIR research team selected highly qualified California educators to serve on two professional judgment panels, each of which participated in a three-day meeting to design instructional programs for students in schools of varying demographic compositions. We ask the panels to design instructional programs so that students would have the full opportunity to meet “academically rigorous content standards and performance standards in all major subject areas” as defined by the state legislature and targeted proficiency levels.¹⁹ These panels were then asked to specify the resources necessary to deliver those programs.

Prior to deliberations, the PJPs were presented with summaries of public engagement materials developed by other authors (notably the Public Policy Institute of California) as well as brief summaries of existing educational research on school effectiveness. During their deliberations, panels were provided with additional information about the student proficiencies achieved and resource profiles of actual public schools in California that mirrored the demographics of the school prototypes presented to the panels for their tasks. We have provided further details on the manner in which these PJPs functioned in Chapter 2 of this report.

Professional Judgment Framework

To achieve the study objective, the AIR research team focused the analysis on school-level programmatic costs. Overhead rates were applied to these school-level costs in

¹⁸ See Supreme Court Of The State Of New York, County Of New York, Campaign For Fiscal Equity, Inc., et al, Plaintiffs, -against- THE STATE OF NEW YORK, et al, Defendants. Index No. 111070/93,m Justice DeGrasse, J.

¹⁹ For a complete statement of the standards around which professional judgment panels were asked to design programs, see Appendix A in the full report.

order to estimate the additional costs of district-level central administration and maintenance and operations services, and the cost of home-to-school transportation services have been assumed to remain unchanged. Finally, we also took account of variations in the costs of comparable personnel by using estimates of the variations personnel costs in different labor markets across the state.²⁰ The rationale behind these estimates is that available revenues should, at a minimum, be sufficient to provide an opportunity for all students to meet the California content and performance standards, and in order to accomplish this objective, projected revenues for each school district need to be adjusted by geographic cost differences across labor markets within California to equalize the purchasing power of the educational dollar.

Professional Judgment Model

AIR principal investigators involved with this research project pioneered means for involving informed educators in the process of designing costing-out models. Initial research in this arena was conducted in Illinois and Alaska (see Chambers and Parrish, 1982 and 1984). These early studies asked panels of educators to define service delivery systems that were appropriate to meet the educational needs of various student populations. Detailed input models (e.g., regular classrooms and specialized instructional and related services) were designed for separate categories of students including regular elementary and secondary, disadvantaged, disabled, gifted, and vocational students.

In a recent project in New York State, Chambers et al (2004) used an enhanced professional judgment model to determine the cost of an adequate education. There are three elements that distinguished the New York work and other recent applications of the professional judgment model (e.g., MAP, 1997, 2001; Augenblick, 1997, 2001; and Augenblick and Myers, 2003) from the earlier work of Chambers and Parrish (1982, 1984):

- 1) The goals established for the professional judgment panels were clearly focused on student outcomes. In the New York study, for example, the goals were based on the Regents Learning Standards established by the state.
- 2) The professional judgment panels were asked to begin their deliberations by designing instructional programs at each schooling level. After determining the content and structure of the educational program, panels were then asked to develop resource specifications necessary to deliver the desired services.
- 3) The professional judgment process was structured to provide for a more integrated approach to meeting the needs of all types of students. The early models developed by Chambers and Parrish organized separate panels to develop delivery systems for students in various demographic categories. The current process organizes educators to work together to think about the instructional

²⁰ We applied a geographic cost of education index (GCEI) reflecting labor market variations across the state of California developed by Rose (2006).

needs of all students in a more integrated fashion by establishing sub-panels and providing the opportunity for a full panel debrief and resource modification.

California Professional Judgment Model

While the current California study is in some ways a more abbreviated version of the New York professional judgment model, the AIR team has taken additional steps to improve and tailor the model to reflect the circumstances in the state. First, the AIR research team placed a stronger emphasis on the program design dimension of the PJP deliberations. Specifically, a more explicit definition of the instructional program design component of the process was provided to the panels. In addition, panels were led through a more structured set of questions surrounding instructional program design during their deliberations.²¹

Second, panels were provided with information on the relative costs of the resources used in their specifications and the per-pupil cost implications of their decisions. In New York, the panels were only asked to specify the resources required to deliver the programs without any information about their relative costs (e.g., the hourly or annualized cost of teachers versus aides or specific instructional support personnel). In the California study, explicit information on these relative costs, plus immediate feedback on the per-pupil cost implications of their resource allocation decisions, was provided to panels. These modifications were made under the pretense that this information would encourage efficiency at the programmatic level.

Third, panels were provided supplemental information including state-average student performance and proficiency levels and representative values of these outcomes for schools with typical demographic compositions. As mentioned, the panels were instructed to develop instructional programs and specify resources for schools exhibiting pre-determined levels of student needs (e.g., reflected by percent of students living in poverty, English language learners, and students receiving special education services). In order to give panels an idea of how far students would need to move in order to achieve the desired goals, these instructions were supplemented with average 2005 proficiency rates on the English language arts and math California Standards Tests and overall performance levels (API and graduation rates) of schools with similar demographics. In addition, the average number of personnel and certain non-personnel expenditures for schools with typical demographic profiles were given to panels for reference. Default values, where available, were derived by taking the average number of personnel from resource profiles gathered from actual California schools with similar demographics.²²

Finally, the AIR research team did not attempt to synthesize the PJP specifications into a single set of resource estimates. In the New York study, the synthesis of the resource specifications reduced the value of program design component and rendered it impossible

²¹ Please see Appendices B and C for the PJP instruction set and the program design guide, respectively.

²² Default values for selected non-personnel expenditures were predicted using regression analysis and the Standardized Account Code Structure (SACS) fiscal data that is only available at the district-level. Further details of this procedure are available upon request.

to relate the program designs to the resource specifications and subsequent cost estimates. Instead, the results of the two general and six sub-panels are treated as separate cost estimates and reported independent of one another.²³

Limitations of the California Study

Due to a limited budget, only two distinct panels were convened and there was no attempt to match the PJPs to specific types of districts (e.g., urban, suburban, or rural). Rather, representatives from urban and rural school districts were distributed between the two panels. In addition, rather than a full public engagement process, the AIR research team relied on existing studies of public opinion (see Baldassare, 2005) and publicly available policy statements from the California State Board of Education in developing the goals statement underlying the PJP deliberations (see Appendix A of this report).

Furthermore, budget limitations prevented AIR from organizing a full panel of stakeholders to review and provide feedback to the educators involved in the PJP process. Accountability to stakeholders often encourages PJPs to be more circumspect about the process of program design and resource specifications. Although there was no accountability to a stakeholder panel, the AIR research team did explain to panelists that their names would be published in the report and that the instructional designs would be publicly available. In fact, panelists were asked to sign a statement acknowledging their awareness that their names would be published with this report along with the text of the program design documents that they developed during their deliberations.

In terms of the actual panel deliberations, there were several limitations surrounding the instruction program design. Panels were expected to design instructional programs that they would “reasonably expect to be adopted and funded by a school board comprised of knowledgeable, well-intentioned lay persons.” Panels were free to configure programs in any way they felt confident would deliver the desired results, but were advised that their program design should be “practical and have a reasonable chance of being implemented successfully by competent educators.” While there was flexibility in program design, some panelists reported feeling constrained from thinking “outside the box” not only by the requirements stated in the instruction set, but by their personal experiences with educational code realities, budgetary constraints and current research trends.

What Professional Judgment Panels Were Not Expected to Accomplish

Panels were not asked to determine non-school specific costs including expenditures on student transportation, building maintenance and operation, district office operation, or food service. Similarly, debt service and major facility construction matters were not within the purview of the PJPs. As mentioned above, the AIR team incorporated cost estimates for district office functions as well as the maintenance and operations of district and home-to-school transportation in a later stage of analysis.

²³ However, the average of the two independent estimates is reported in the main results below.

It should also be noted that no analysis of the expenditures on debt service for school facilities was carried out as part of this project. Exclusion of these components is not to say that they are not important. Both interact in significant ways with any effort to address the adequacy of funding for educational services. However, these components of school expenditure require specialized analyses beyond the scope of this project.

In addition, PJPs were not asked to impute dollar costs to the instructional programs they designed. AIR used average compensation levels (i.e., salaries and fringe benefits) and adjusted these for geographic variations in the costs of school personnel across the state. Panelists were able to adjust teacher salaries through the inclusion of extra professional development and teaching days for extended year programs.

Organization of the Remainder of Report

This report contains four additional chapters and a set of formal appendices available in a separate document. Chapter 2 describes the context, selection process, and operational logistics for the professional judgment panels and shows how this process was utilized to construct the foundation for estimating the cost of an adequate education. Chapter 3 explains how the specifications were translated into cost estimates, while Chapter 4 presents the detailed results of the actual costing out. Chapter 5 offers conclusions and observations regarding processes involved and the outcomes from this study. Appendices A through F contain technical information and copies of materials provided to the PJPs.

The intention is that the five chapters of this report and detailed appendices will enable a reader to understand the analysis underlying the results of this study. In addition, this detailed reporting is intended to fulfill one of the research team's principal objectives - rendering transparent the processes by which "adequate costs" were determined. These detailed materials and descriptions of processes should enable other analysts to repeat these methods and to substitute their own assumptions for those used by the AIR research team.

Chapter 2 - Measuring Pupil Need Through the Professional Judgment Process

An Overview of the PJP Component

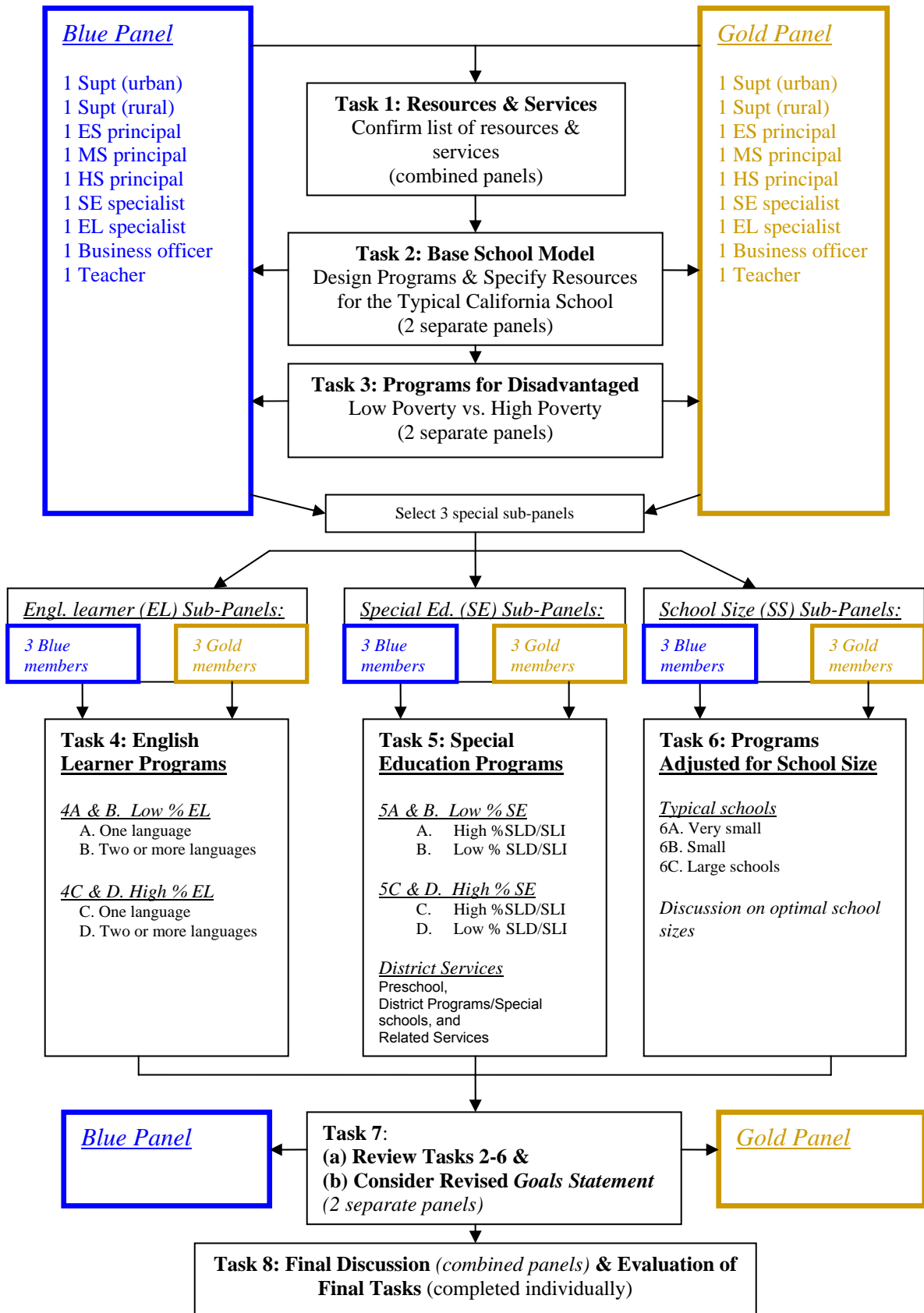
To develop the range of estimates of what it might cost to provide an adequate educational program for California public schools, AIR selected two independent panels (subsequently referred to as the Blue and Gold Panels) of highly qualified educators to carry out a series of tasks over the course of a three-day meeting. Each panel was first asked to develop a “base model” instructional program for elementary, middle and high schools reflecting demographic levels of ‘typical’ California schools at each level (specifically a school with median percentages of students receiving free- and reduced-price lunch, English Language Learners, and students receiving special education services and at the median school size). After completing the instructional program design, each panel was asked to use input worksheets feeding into an MS Excel cost model to specify resources necessary to deliver that program.

Upon completion of the instructional program design and resource specifications for the base model, each panel was asked to make modifications for schools with varying demographic compositions and sizes. Panels first made modifications for schools with low and high poverty levels (determined by the number of students receiving free or reduced lunch) for elementary, middle and high school levels. To make the process more efficient, each of the full panels was divided into three independent sub-panels. Each sub-panel followed a similar series of tasks and modified the program design and resources based on schools with varying numbers of English learners, students receiving special education services, and of varying size. Given the high correlation between poverty and ELs,²⁴ the demographics of schools addressed through the EL and poverty tasks were linked in order to provide schools that are more representative of those found throughout the state. Full panels were given the opportunity to review the work completed by the sub-panels and make modifications in light of more specified deliberations.

Exhibit 2-1 provides an overview of the original organization of the series of tasks completed by the professional judgment panels. Due to time constraints, the entire series of tasks was not completed by both of the panels. A more detailed description of the tasks that were completed is provided below.

²⁴ The simple correlation between these two factors is 0.69 (i.e., where there are high percentages of students in poverty, there tend to be high percentages of ELs).

Exhibit 2-1 - Flow Chart for PJP Tasks and Activities



Criteria for Evaluating Professional Judgment Studies

Several researchers have used professional judgment methodology to estimate the cost of providing an adequate educational program.²⁵ Although they have employed various procedures, all have in common a reliance on the judgment of professional educators derived through deliberations around a series of structured exercises. Just as there is no one best way to estimate the cost of providing an adequate education, there is no one best way to conduct a study that relies on professional judgment. There are, however, a number of criteria against which any professional judgment study can be measured. These may not be the only criteria one would use to evaluate the professional judgment process, but AIR proposes these as common sense standards against which any study of this type should be evaluated.

1. *Transparency* - Transparency is the primary advantage attributed to the professional judgment method for estimating adequacy. Therefore, the entire process conducted should be explicit so that policy makers and others can consider the validity of each aspect of their recommendations as well as the overall quality of its outcomes.
2. *Qualifications of Participants* - Participants should be professional educators recognized as highly competent who are experienced in allocating resources and producing high-quality student outcomes.
3. *Potential Conflict of Interest* - To the extent possible, participants should be free of conflicts of interest. To the extent that they have potential conflicts, these should be made explicit.
4. *Reliability* - Multiple groups of similar expert educators should complete identical exercises to enhance the reliability of the process.²⁶
5. *Records for Replicability* - Sufficient records of the process should be reported to allow others to replicate it.
6. *Pricing* - Prices used to estimate resource costs (e.g., teachers' salaries) should be based on prevailing market prices or result from rigorous economic analysis.

²⁵ For example, see Chambers and Parrish (1982, 1984), MAP Reports (1997, 2001), and Augenblick (September 2001, Augenblick and Myers (2003), and Augenblick, Palaich and Associates, Inc. (2003) for samples of previous studies that have used this approach.

²⁶ Clearly, multiple groups provide a range of estimates that can be evaluated and as the number of groups increase, will ultimately provide a more reliable estimate of the true cost of providing an adequate education.

Setting Goals

The first step in the conduct of a professional judgment study involves defining the concept of adequacy. During the spring of 2006, the AIR research team met with members of the “Getting Down to Facts” study group and explored state education code requirements to address two questions:

- What constitutes an adequate educational opportunity?
- What do public schools in California need in order to ensure all their students an opportunity for an adequate education?

The first question was fundamental to the California professional judgment process. Any estimation of costs requires first the definition of “cost to do what?” That is, what are the specific outcomes that these instructional programs are trying to achieve?

To answer this question, the AIR research team used data presented in the 2005 Accountability Progress Report prepared by the California Department of Education (CDE) to identify target proficiency levels for ELA and mathematics, API scores, and desired graduation rates. While targeted outcome levels are a fundamental piece of California’s requirements, the content standards are the cornerstone on which these outcome levels are based. The CDE reports that “the vision guiding these standards is that all students must have the opportunities, resources, time, and support needed to achieve mastery.” With these content standards and desired outcome levels in mind, AIR asked panels to design programs to achieve specific goals.

Exhibit 2-2 presents the *Goals Statement* given to the PJPs prior to beginning their deliberations. This statement was not only included in the general instructions provided to the panel members, but it was also presented and discussed on the first day of the PJP meetings by the project principal investigator.

Upon careful reading of the *Goals Statement* used for this study, the reader will notice that we explicitly selected the 2011-12 proficiency standards as a benchmark for the professional judgment panels. This choice was made in part based on our experience in the New York adequacy study. During our culminating public engagement meeting for that study, none of individuals representing the constituencies invited to discuss the *Goals Statement* used in the New York study believed that 100% proficiency for all students as required by NCLB in 2013-14 was a *realistic* or feasible goal. Largely for this reason, we decided to set a goal that did not require this unrealistic standard of proficiency.²⁷

²⁷ A more recent analysis by Rothstein, Jacobsen, and Wilder (2006) raise questions even about the legitimacy of any of the proficiency standards set out in NCLB. These authors state it as follows:

“...the conceptual basis of NCLB is deeply flawed; no goal can simultaneously be challenging to and achievable by all students across the entire achievement distribution. A standard can either be a minimal standard which presents no challenge to typical and advanced students, or it can be a challenging standard which is unachievable by most below-average students. No standard can serve both purposes – this is why we call ‘proficiency for all’ an oxymoron - but this is what NCLB requires.” (p. 2)

Exhibit 2-2 - Goals Statement

Background

The federal No Child Left Behind Act and state law requires that *all* students in every school district meet “academically rigorous content standards and performance standards in all major subject areas” by the 2013-2014 school year and to make steady progress toward that goal each year {*Cal. Educ. Code 60602(a)(2)*}.

(1) Access to California Content Standards

All students should have access to instructional programs and services that are consistent with the California content standards in all subject areas, listed below, as adopted by the State Board of Education.

- **English language arts** standards direct children in learning to understand written and oral language expression, to communicate effectively, to comprehend and appreciate a diversity of literature, and to comprehend various sources of information.
- **Math** standards are designed to prepare students to grapple with solving problems; develop abstract, analytic thinking skills; learn to deal effectively and comfortably with variables and equations; and use mathematical notation effectively to model situations.
- **History-social science** standards emphasize historical narrative, highlight the roles of significant individuals throughout history, and convey the rights and obligations of citizenship.
- **Science** standards are viewed as the foundation for understanding technology and societal issues. These issues are strongly connected to community health, population, natural resources, environmental quality, natural and human-induced hazards, and other global challenges.
- **Visual and performance arts** standards represent a strong consensus on the skills, knowledge and abilities in dance, music, theatre and the visual arts that students should be able to master at specific grade levels.
- **English language development** standards define what all students, including those learning a second language, are expected to be able to know and do. These standards are designed to supplement the ELA content standards to ensure that limited English-proficient (LEP) students develop proficiency in both the English language and the concepts and skills contained in the ELA content standards.
- **Physical education** standards are based on the premise that the quality and productivity of each individual's life can be enhanced through participation in a comprehensive, sequential physical education system that promotes physical, mental, emotional, and social well-being.

(2) Target Performance Levels for California Public Schools

As of the 2005-06 school year, all California high school students (except for certain students with disabilities) will be required to achieve a passing score on the California High School Exit Examinations (CAHSEE) in English language arts and mathematics to receive a high school diploma. As of the 2005-06 school year, students in grades 3-8 will be tested in English and mathematics (and shortly thereafter in science) to determine whether they are making satisfactory progress toward meeting the learning standards. Rates of yearly progress toward these goals must be disaggregated by racial, economic, disability and limited English proficiency subgroups. The target outcomes for deliberations of the professional judgment panels should be directed toward those established by the California Department of Education for the 2011-2012 school year as follows:

- **Participation rates** of 95% school-wide and for each subgroup.
- **English-language arts proficiency rates** of 78.4% for elementary and middle schools and 77.8% for high schools.
- **Mathematics proficiency rates** of 79.0% for elementary and middle schools and 77.4% for high schools.
- **An Academic Performance Index (API)** of 740 in every elementary, middle, and high school (an API target of 800 will be addressed in a later task).
- **A high school graduation rate** of 83.4%.

Recruiting Process

The objectivity and expertise of the educators involved in the PJPs is critical to the validity of the final product. Objectivity of participants is difficult to measure, but it is fair to note that all participants were aware that their work product could be used to influence levels of resources made available to public schools in the State of California.

AIR engaged in an extensive effort to recruit highly qualified educators to participate on each of the PJPs. Approximately 122 educators were considered for participation in the study. These individuals were identified through two processes:

- Individual educators associated with schools that have been identified through a series of separate AIR studies as high performing (i.e., schools that were “beating the odds” or that had exhibited consistently high growth over the past five years).²⁸
- Individual educators who were nominated by participants in the “Getting Down to Facts” study group, county superintendents, and numerous professional education agencies throughout the state (a full list of the organizations and individuals that provided nominations during the recruitment process is provided upon request).

Selection Process

Approximately 45 educators responded to the invitations, and 18 were chosen to participate. To ensure that the educators represented a range of expertise and experiences, responses were sorted according to the participants’ geographic location, current position, district and/or school size, urbanicity, district and/or school performance indicators and areas of expertise.

Each of the two panels consisted of nine educators including at least one superintendent each from an urban and rural area of the state; three principals with one from each grade level (i.e., an elementary, middle school, a high school), a special educator (e.g., a district director of special education), an English learner specialist, a school business official, and a classroom teacher. No panel included more than one employee from a given district. Within these constraints, every effort was made to select participants who represented the size and geographic diversity in California.

A separate costing-out study in the “Getting Down to Facts” suite of reports relies on a large random sample of superintendents, principals and teachers to provide resources arrived at independently from these respondents (see Sonstelie et al, forthcoming). This approach has the advantage of being able to gather a greater amount of data in a much more efficient manner and allows one to document differences in the resource combinations deemed “adequate” across the various respondent types. However, the panel approach we used here has several merits that deserve mention.

First, our approach makes use of a comprehensive panel with expertise across several dimensions of student need. We do so because it is difficult to assume that any

²⁸ See Parrish, et al (2006) and O’Day and Bitter (2003).

individual, whether a superintendent, principal or teacher embodies all of the knowledge and experience necessary to develop program designs necessary to meet the needs of all types of students. We feel it is important to have a broad array of district and school leadership teams for this purpose and to include expertise in certain programmatic areas working cooperatively to reach a consensus regarding program design than to rely on a single individual to carry out these exercises. Moreover, we believe that school personnel at all levels from the central office to classroom have something to contribute in designing programs.

Second, the panel approach used here requires the “bottom-up” development of a detailed program design document upon which subsequent resource specifications are based. While we feel that the development of such a program design document helps provide a foundation for the resource specifications, it also serves as a valuable justification of why the specified resources matter and how they will be used to provide an adequate educational program.

Third, decisions concerning necessary resource allocations arrived at using panels of individuals forces decisions based on a *consensus* of experts, which we feel to be a more reliable indication of what it really takes to deliver an adequate schooling program.²⁹

Overview of Panel Deliberations

AIR convened one three-day professional judgment panel session from June 21 – 23, 2006. In all, 18 outstanding educators participated in both general and task specific panels. The two general panels (henceforth referred to as Blue and Gold PJPs) operated independently of one another. Each panel was asked first to design instructional programs and allocate resources for elementary, middle and high schools with demographics representative of the “typical” California school. After developing these base instructional programs, the panels specified how these would change in response to varying levels of student poverty. After these two tasks, each panel was divided into three sub-panels and asked to design instructional programs for schools with populations of varying incidences of English language learners, students identified as needing special education services, and for schools of varying size. The intent was to have the full panels reconvene to share the results of the work completed in the sub-panels. While one panel was able to reconvene and modify their base instructional program according to the results of the sub-panels, the other panel completed this step electronically (i.e., through e-mail communications) due to time constraints.

Each sub-panel contained a specialist on the topic that the sub-panel was addressing (i.e. – a special education specialist on the special education sub-panel, an EL specialist on the

²⁹ An anonymous reviewer was concerned about how the panels reached consensus and whether “louder” panelists tended to dominate the sessions. The program design documents that we provided to each panel forced the participants to debate over critical issues. But in each case, the design elements asked the panels to attempt to reach a consensus over the design elements. A trained AIR facilitator was always present to make sure all panelists’ views were heard and to help the groups reach a consensus without forcing it. Our experience was that the members of these panels worked very cooperatively with one another.

English learner sub-panel, and a superintendent from a small, rural school district on the school size panel) along with two other educators with appropriate experience and/or background. Please see Appendix D for panel and sub-panel assignments along with panelist biographies.

Prior to convening the PJP meetings, we sent each panelist a full set of PJP instructions which included the *Goals Statement*, a report on public engagement produced by the Public Policy Institute of California (PPIC), and a brief summary of research on effective educational practices and interventions.³⁰ Panelists were informed that the public engagement report and summary of research were provided for their information, and they could rely on them to the extent that they chose.

Task Assumptions

The instructions developed by the AIR team contained 12 assumptions that described the context in which an instructional program was to operate and certain constraints on the resources the PJP could affect. The purpose of the assumptions was to make the exercise as realistic as possible within the constraints of available participant time and expertise. Panelists were instructed to assume that specified levels of spending on facilities, district administration, and transportation were given and could not be changed as part of the exercise. Panelists were to assume that prototypical schools were not being newly created, but rather that these schools were to be thought of as ongoing enterprises. Also, they were told to use their professional judgment in order to determine what types and quantities of special education students should be served in neighborhood schools, as opposed to more centralized facilities.

Task Specifics

Participants were directed to design instructional programs for prototypical elementary, middle, and high schools that they agreed would provide a full opportunity to the student populations specified in the instructions to acquire the knowledge currently specified in the California content standards and desired outcome levels as noted in the *Goals Statement* above. Only after they had designed instructional programs were panel participants asked to determine the types and levels of resources necessary to implement those programs.

The first task completed by each PJP required all participants to review and agree upon a list of program elements (e.g., types of personnel, supplies and materials) required to implement an instructional program sufficient to produce the outcome standard specified above. Before beginning the first task, panels were also asked to identify programmatic issues that cut across school levels (e.g., the extent to which special education students were served in neighborhood schools).

In the second task, we asked each panel to develop “base model” instructional programs and specify resources for elementary, middle and high schools at median levels of student needs and size (i.e., in the typical California school at each grade level). Panels were

³⁰ Copies of the materials provided to the PJPs and other relevant information associated with the selection and organization of the panels are included in the Appendices of this report.

given a series of open-ended questions about the allocation of personnel, materials and supplemental programs and asked to design instructional programs and allocate necessary resources to give students the opportunity to meet the established outcome goals. These base model programs served as the foundation for all remaining tasks.

For the next task, we asked each panel to develop programs to meet the educational needs of students served in schools in which poverty levels were lower and then higher than the typical California schools (i.e., the percent of students eligible for free- and reduced-price lunch were lower and higher than the median). The AIR team modified the poverty parameters according to schools in the 10th and 90th percentiles of students in poverty, and we used parameters unique to each school level to account for differences in reporting of students receiving free- and reduced-price lunch program at the elementary, middle, and high school levels. To facilitate this activity, the panels were provided with input resource worksheets that were integrated into our cost model.

Exhibit 2-3 provides a generalized version of the input worksheet used to record the resources specified by the panels:

Exhibit 2-3 – Generalization of Resource Specification Input Worksheet Used by Professional Judgment Panels					
PJP Specified Resources	Base Model • % Poverty = $p1$ • % Spec. Ed. = $s1$ • % ELL = $e1$ • Enrollment = $n1$	Model 2 – Low Poverty • % Poverty = $p2$ • % Spec. Ed. = $s2$ • % ELL = $e2$ • Enrollment = $n2$	Model 3 – High Poverty • % Poverty = $p3$ • % Spec. Ed. = $s3$ • % ELL = $e3$ • Enrollment = $n3$	.	Model K • % Poverty = pK • % Spec. Ed. = sK • % ELL = eK • Enrollment = nK
Resource 1 (FTE Core Classroom Teacher)	$FTE_{1,1(p1, s1, e1, n1)}$	$FTE_{1,2(p2, s2, e2, n2)}$	$FTE_{1,3(p3, s3, e3, n3)}$	.	$FTE_{1,K(pK, sK, eK, nK)}$
Resource 2 (FTE Teacher Aide)	$FTE_{2,1(p1, s1, e1, n1)}$	$FTE_{2,2(p2, s2, e2, n2)}$	$FTE_{2,3(p3, s3, e3, n3)}$	.	$FTE_{2,K(pK, sK, eK, nK)}$
Resource 3 (FTE Psychologist)	$FTE_{3,1(p1, s1, e1, n1)}$	$FTE_{3,2(p2, s2, e2, n2)}$	$FTE_{3,3(p3, s3, e3, n3)}$	.	$FTE_{3,K(p3, s3, e3, n3)}$
...
Resource 4 (Supplies and Materials Dollars)	Dollars $_{4,1(p1, s1, e1, n1)}$	Dollars $_{4,2(p2, s2, e2, n2)}$	Dollars $_{4,3(p3, s3, e3, n3)}$	.	Dollars $_{4,K(pK, sK, eK, nK)}$
...
Resource X	$FTE_{X,1(p1, s1, e1, n1)}$	$FTE_{X,2(p2, s2, e2, n2)}$	$FTE_{X,3(p3, s3, e3, n3)}$	.	$FTE_{X,K(pK, sK, eK, nK)}$

For reference, mean outcome levels (specifically, English language arts and math proficiency rates and the school level API score) for schools with these parameters were also provided to the panels.³¹ To isolate the effect of poverty, all other demographic levels remained constant.

³¹ For practical purposes we established reasonable bands around the demographic need variables (i.e., lower and upper bound limits of percent poverty, EL and special education as well as size) to permit identification of an actual sample of California public elementary, middle, and high schools from which representative average needs and outcomes could be calculated.

Exhibit 2-4 contains a summary of the base model and poverty task parameters presented to the PJPs.

Exhibit 2-4 – Permutations of Base Model and Poverty Tasks Completed by Professional Judgment Panels				
		Task Demographic Levels		
		Base Model	Low Poverty	High Poverty
		Task 2	Task 3a	Task 3b
Elementary	% Free/Reduced Lunch	57	14	89
	% ELA Proficiency	41	60	29
	% Math Proficiency	49	66	41
	API	745	830	690
Middle	% Free/Reduced Lunch	51	18	85
	% ELA Proficiency	39	54	28
	% Math Proficiency	33	48	26
	API	702	776	655
High	% Free/Reduced Lunch	33	9	71
	% ELA Proficiency	50	70	33
	% Math Proficiency	47	68	29
	API	684	770	598
<p>Yellow cells denote state median values. Grey cells denote the permutation in the demographic level for the specific task. In short, Exhibit 2-3 states that for Task 2, the PJPs were required to design adequate instructional programs to serve student bodies with median poverty rates of 57%, 51% and 33% at the elementary, middle and high school-levels, respectively. Tasks 3a and 3b asked panels to change their base model accordingly in response to decreases and increases in the percentages of students receiving free- and reduced-price lunch.</p>				

On the third day, each of the Blue and Gold PJPs were divided into sub-panels – i.e., an EL panel, a special education panel, and a school size panel. Each of the sub-panels was asked to modify their base instructional program to meet the educational needs of schools with varying levels of English language learners (again, those at the 10th and 90th percentiles), students receiving special education services, and of varying school size. Given the high correlation between poverty and ELs, the AIR team chose to link the EL and poverty tasks in order to provide schools that were more representative of those found throughout the state. For example, we asked the panels to consider for their high poverty prototypes what would need to change if the percent of EL students increased, and for their low poverty prototypes what would need to change if the percent of EL students decreased. The notion here was to link the changes in program design and resource specifications of the low and high poverty schools independently with the changes in the percent of the population requiring EL services.

Panels were originally asked to revise their program design and resource specifications for (1) schools serving lower and higher percentages of English learners who are

predominantly Spanish-speaking students and for (2) schools serving lower and higher percentages of English learners who represent a wider mix of non-English languages (i.e., from a school with one non-English language to a school with two or more non-English languages). However, due to time constraints, neither panel addressed modifications in program design surrounding schools resulting from a wider mix of languages.

Exhibit 2-5 includes a summary of the English learner task parameters presented to the PJPs.

Exhibit 2-5 – Permutations of English Language Learner Tasks Completed by Professional Judgment Panels				
		Task Demographic Levels		
		Base Model	Low EL	High EL
		Task 2	Task 4a	Task 4c
Elementary	% Free/Reduced Lunch	57	14	89
	% English learner	28	5	60
	% ELA Proficiency	41	68	21
	% Math Proficiency	49	73	35
	API	745	865	649
Middle	% Free/Reduced Lunch	51	18	85
	% English learner	17	4	41
	% ELA Proficiency	39	61	22
	% Math Proficiency	33	64	20
	API	702	812	618
High	% Free/Reduced Lunch	33	9	71
	% English learner	12	2	34
	% ELA Proficiency	50	67	21
	% Math Proficiency	47	63	38
	API	684	768	613
Yellow cells denote state median values. Grey cells denote the permutation in the demographic level for the specific task. In short, Exhibit 2-4 states Tasks 4a and 4c asked panels to change their respective poverty models accordingly in response to decreases and increases in the percentages of students identified as ELs.				

In a similar fashion, the special education (SE) sub-panel was asked to modify their base instructional program to meet the educational needs of schools with varying levels of students receiving special education services. Specifically, the SE panel was asked to make any necessary revisions to the program design and resource specifications for (1) schools serving lower and higher percentages of SE students (specifically, the 10th and 90th percentiles), and (2) schools serving varying percentages of SE students with certain disabilities. Again, due to time constraints, neither panel addressed modifications in

program design surrounding schools serving varying compositions of special education students classified by disabilities.

Exhibit 2-6 includes a summary of the special education task parameters presented to the PJPs.

Exhibit 2-6 – Permutations of Special Education Task Completed by Professional Judgment Panels				
		Task Demographic Levels		
		Base Model	Low % SE	High % SE
		Task 2	Task 5a	Task 5b
Elementary	% students receiving SE services	9.2	5.2	14.3
	% ELA Proficiency	41	41	42
	% Math Proficiency	49	50	52
	API	745	747	753
Middle	% Free/Reduced Lunch	9.8	6.6	13.5
	% ELA Proficiency	39	42	36
	% Math Proficiency	33	35	29
	API	702	721	690
High	% Free/Reduced Lunch	9.2	5.3	12.8
	% ELA Proficiency	50	52	48
	% Math Proficiency	47	49	45
	API	684	703	673
Yellow cells denote state median values. Grey cells denote the permutation in the demographic level for the specific task. In short, Exhibit 2-5 states Tasks 5a and 5c asked panels to change their base models accordingly in response to decreases and increases in the percentages of students identified as needing special education services.				

The special education sub-panels were also asked to determine and describe district-level special education programs and resources. These district-level components include instructional and related services offered to special education students not served in the neighborhood schools, those requiring related services not already specified in school-level instructional programs, and those aged 3-4 requiring preschool programs. Unfortunately, time constraints prevent either of the two special education sub-panels for completing this task.

Finally, two sub-panels were asked to design instructional programs and allocate resources for schools of varying size. Specifically, sub-panels were asked to revise their base model instructional program design and resource specifications for (1) very small schools, (2) small schools and (3) large schools. Again, due to time constraints, neither sub-panel addressed modifications in program design for large schools.

Exhibit 2-7 contains a summary of the school size task parameters presented to the PJPs.

Exhibit 2-7 – Permutations of School Size Task Completed by Professional Judgment Panels				
		Task Demographic Levels		
		Base Model	Very Small Schools (10 th percentile)	Small Schools (25 th percentile)
		Task 2	Task 6a	Task 6b
Elementary	Enrollment	516	189	370
	% ELA Proficiency	41	43	39
	% Math Proficiency	49	55	48
	API	745	756	735
Middle	Enrollment	992	189	370
	% ELA Proficiency	39	45	39
	% Math Proficiency	33	36	34
	API	702	723	709
High	Enrollment	1,662	129	505
	% ELA Proficiency	50	61	50
	% Math Proficiency	47	43	46
	API	684	702	684

Yellow cells denote state median values. Grey cells denote the permutation in the demographics for the specific task. In short, Exhibit 2-6 states Tasks 6a and 6b asked panels to change their base models accordingly in response to decreases and increases in school size.

Overall Deliberation Trends

As mentioned, the instructional program designs developed by the PJPs added resources to reduce class sizes, extended the instructional day and year for all students, and added specialists to work with small groups of students and foster professional development opportunities for teachers. The need for high-quality professional development was seen as integral for improving student achievement and retaining quality teachers. Most importantly, panels emphasized that student achievement wasn’t necessarily dependent on the number of personnel staffed at the school level, but how their roles and time were allocated. Further exploration of the qualitative aspects of the instructional program design occurs in Chapter 3.

Summary

Every effort was made to secure two diverse panels of highly qualified educators. Nominations were solicited from a wide variety of constituent groups from around the state as well as from schools that were identified as “beating-the-odds.” A careful process was then followed to screen these potential candidates. The AIR research team tried to secure panelists with a wide variety of expertise and experience that were

representative of the diverse size, urbanicity, and location of districts in the state. We stressed that the names of panels would be available to the public and their work would potentially be scrutinized.

During program deliberations, panelists asked to proceed through a series of tasks that emphasized program design first and then asked about resource specifications only after program designs were completed. We began with a base model prototype for the median elementary, middle and high school and then asked panels to explore variations in program design and resource specifications associated with changes in pupil needs including poverty, EL, and special education. Additional information was provided to panelists in the form of average outcome levels of schools of similar demographics for all tasks and default values were provided for certain personnel and non-personnel expenditures for the base model task.

Due to the high level of detail in the initial base model deliberations, the panels unfortunately were not able to complete all of the exercises. As a result, we were not able to explore fully the impact of changes in the number of languages for EL students, the complexity of different disability mixes, and the impact of a full range of variations in school size. However, since there was a high level of detail and thought given to the base model deliberations, the instructional program designs are complex and thorough, and provided a valuable foundation for the cost analysis of adequacy presented in the following chapters.

Chapter 3 - Translating Resource Specifications into Cost Estimates

Following the PJP's meetings, the AIR team had a series of nine cost estimates from each panel that summarized per-pupil expenditures for each school level (i.e., elementary, middle, and high school) across various combinations of pupil needs and school size. The various pupil need and school sizes are based on those specified in Exhibits 2.4 to 2.7, above, for Tasks 2 (the base model), 3A and 3B (the low and high poverty prototypes), 4A and 4C (the low and high EL prototypes conditional on student poverty), 5A and 5B (the low and high proportions of special education prototypes), 6A and 6B (the very small and small schools prototypes). These cost estimates reflect the per-pupil dollar value of personnel and non-personnel resources each panel deemed necessary for elementary, middle and high schools to achieve the specified goal for each combination of pupil needs and school size. This analysis was utilized to generate several equations that reflect the patterns of variation in elementary, middle, and high school program specifications and subsequent expenditures in relation to school enrollment and pupil needs. This chapter explores the patterns in the resources specified by the panels, variations in cost vis-à-vis student needs, and how these are translated into the projected additional expenditures needed to bring districts and the state to “adequate” spending levels.

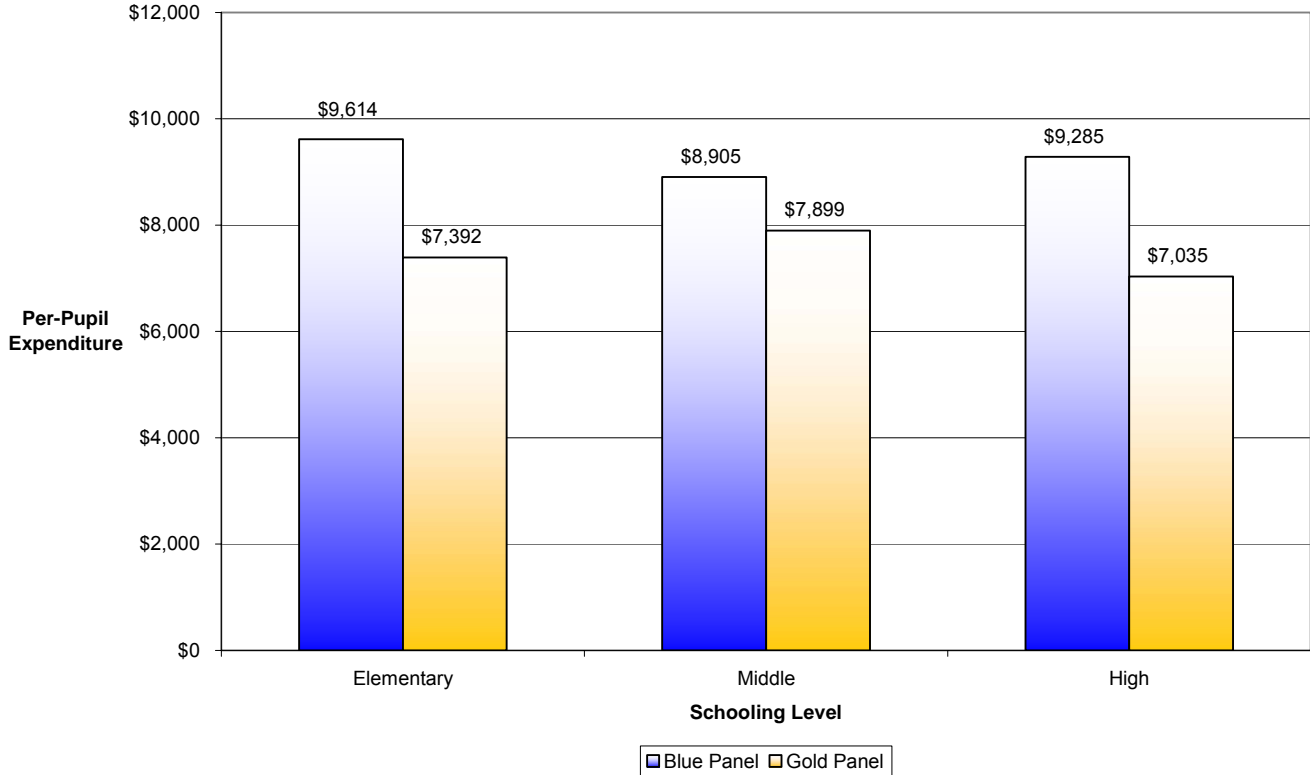
Overview of Cost Estimates

As mentioned, school program per-pupil expenditure estimates were derived from resource specifications generated by two independently operating panels. The expenditure figures represented in the following exhibits represent total school program expenditures per pupil only and *do not* include preschool programs or any of the district-level functions such as central administration, maintenance and operations or transportation that were not included in the school prototypes. We will discuss how these district level cost components are estimated in Chapter 4. These figures also use average compensation rates (including salaries and benefits) for the various categories of school personnel included in the school prototypes.³² Adjustments for geographic differences in the costs of education are applied to these prototypes at a subsequent stage of the analysis.

Exhibit 3-1 identifies the per-pupil expenditure estimates generated by the panels during the initial base model task. These estimates were generated for schools of median size with typical levels of student need (defined as the statewide median of students receiving free- and reduced-price lunch, English Learners and students receiving special education services). Again, these figures do not include district level expenditures on central administration, maintenance and operations, and home-to-school transportation that were considered outside the scope of the PJP deliberations.

³² It is important to note that the average salaries use for teachers assume experience levels of 11 years, which is the approximate statewide mean of experience.

Exhibit 3-1 - Comparison of Adequacy Projected School-Level Base Per-Pupil Expenditures by Schooling Level



At first glance, this exhibit highlights what could be perceived as a substantial difference in the cost estimates generated by the Blue and Gold Panels. Since the difference in per-pupil expenditures estimates ranges from \$1,006 to \$2,250 depending on the school level, it is important to closely examine the reasons behind this variation. The following section examines instructional program design trends and provides insight not only into the reasons behind this variation, but also into what professional educators feel are the most critical elements in providing adequate educational opportunities.

Summary Description of the PJP School Program Designs

The most important point to keep in mind in interpreting the levels of education resources emanating from the PJP process is the outcome standard specified for this study. Each committee was asked to design a program that *would provide all students in a school a full opportunity to access instructional programs consistent with the California content standards and the opportunity to achieve proficiency standards established by the California State Board of Education.* It is with this outcome standard in mind that the program specifications resulting from the PJP process must be interpreted.

General Trends

In general, the instructional program designs developed by the PJPs added resources to reduce class sizes, extended the instructional day and year for all students, and added specialists to work with small groups of students and foster professional development opportunities for teachers. The need for high-quality professional development was seen as integral for improving student achievement and retaining quality teachers. Most importantly, panels emphasized that student achievement wasn't necessarily dependent on the number of personnel staffed at the school level, but how their roles and time were allocated.

The panels also added resources for early childhood education and extended day and year programs, especially for schools with high proportions of students in poverty or with high numbers of English learners. Extended time (day and year) programs were seen as necessary not only for students unable to meet the standards, but also as enrichment opportunities for students already performing at proficiency levels. Early education programs were included to help students, especially those without parental or home support, prepare for school.

The following sections examine the base model instructional programs and resource allocation patterns for elementary, middle and high schools. The modifications of these base instructional programs with respect to changing student need and school size is also examined in greater detail below. It is important to note that although resource quantities resulting from these exercises were specifically delineated by the panels (e.g., core classroom teachers, instructional assistants, pupil support personnel, etc.), no intent is implied that individual school districts and schools should be constrained by these specifications. Rather, it is believed that individual schools should be allowed flexibility to use their resources in ways they believe will be most effective within each local context.

Elementary School Base Program

For the elementary school base programs, the independent panels designed instructional programs that were similar in their scope and nature, though somewhat different in their intensity of resource needs. Both panels decided to extend the school day (each by approximately 30 minutes each day) and year (the Blue Panel from 180 to 190 days for instruction, and the Gold panel to 200 days) to allow more time for direct instruction. In addition, both panels specified school wide ratios of 20 students to 1 teacher with smaller class sizes for kindergarten classes and slightly larger class sizes for grades 4 and 5. Both panels specified the need for academic coaches or resource teachers to work both with small groups of at-risk students and teachers in the form of professional development and/or coaching. After-school programs targeted student in poverty, with disabilities and English learners.

As seen in the Exhibit 3-2, the primary difference between panel specifications in the base model occurred in the level of funds allocated for support personnel and for non-personnel expenditures. While one panel specified the need for a full time social worker, school nurse, guidance counselor and technical assistant, the other panel felt that these

services could be part-time positions or that their responsibilities could be subsumed by other personnel. This difference accounts for a large proportion of the difference in cost between the two panels.

Exhibit 3-2 - Suggested Breakdown of Expenditures for Elementary School Base Model Programs developed by Professional Judgment Panels				
Resources	Blue Panel		Gold Panel	
	Per-pupil Cost	Proportion	Per-pupil Cost	Proportion
Instructional Personnel	\$5,682	0.59	\$5,768	0.78
Instructional and Pupil Support	\$1,667	0.17	\$280	0.04
Administrative and Support	\$693	0.07	\$559	0.08
Maintenance and Operations	\$85	0.01	\$212	0.03
Non-Personnel Expenditures	\$733	0.08	\$482	0.07
Extended Day Program	\$290	0.03	\$91	0.01
Extended Year Program	\$465	0.05	\$0	0.00
Total	\$9,614	1.00	\$7,392	1.00

As mentioned, the Blue and Gold Panels each decided to extend the school year (from 180 days to 190 and 200 days, respectively). While the panels chose to extend the school year for all students and teachers, they did so in different ways. The Blue Panel specified that all students should attend an Extended Year program for 10 days while the Gold Panel changed the number of teaching days to 200 at the beginning of the deliberations in a separate sheet that generated modified the salaries of the instructional personnel. While the methods for these specifications differed, the cost implications are the same. However, when examining breakdown of expenditures, the proportion of the per-pupil costs for instructional personnel and the extended year program are moderately skewed.

Middle School Base Program

Exhibit 3-3 shows that the proportion of per-pupil expenditures for each of the instructional components (i.e., classroom teachers, non-personnel expenditures, etc.) specified by the two panels was almost identical. Similar to the elementary school programs, both panels increased the length of the school day and added additional personnel to reduce class size. In addition, personnel for the elective classes was added to both instructional programs in order to provide opportunity for all students to obtain all content standards and provide release time to core teachers for planning, collaboration and work with small groups of students.

As seen in the table below, both panels specified resources such that approximately 70% total per-pupil expenditures was allocated for instructional personnel. However, the Gold Panel specified the need for additional instructional personnel and even smaller class sizes to create smaller learning communities and give teachers greater opportunity for collaboration. This increase in personnel and pupil support costs contributes to the differences between overall panel costs.

Exhibit 3-3 - Suggested Breakdown of Expenditures for Middle School Base Model Programs developed by Professional Judgment Panels				
	<i>Blue Panel</i>		<i>Gold Panel</i>	
Resources	Per-pupil Cost	Proportion	Per-pupil Cost	Proportion
Instructional Personnel	\$6,175	0.69	\$5,453	0.69
Instructional and Pupil Support	\$868	0.10	\$1,036	0.13
Administrative and Support	\$557	0.06	\$597	0.08
Maintenance and Operations	\$44	0.00	\$308	0.04
Non-Personnel Expenditures	\$755	0.08	\$475	0.06
Extended Day Program	\$244	0.03	\$30	0.00
Extended Year Program	\$262	0.03	\$0	0.00
Total	\$8,905	1.00	\$7,899	1.00

In addition, trends in the assignment of instructional support personnel such as social workers, school psychologists, guidance counselors, nurses, and librarians differed between panels. In the average middle school of 992 students, both panels specified a total of approximately 20 full-time-equivalent professional and administrative support staff. After-school programs were prescribed for approximately 55% of the students and targeted for at-risk populations including students receiving special education services, ELLs and students receiving free- and reduced-price lunch.

High School Base Program

Similar to the middle school instructional program, the proportion of per-pupil expenditures for each of the instructional components was almost identical between panels. However, the Blue Panel specified significantly higher levels of per-pupil resources than did its counterpart. To meet exceedingly stringent graduation requirements, both panels extended the school year and prescribed summer school for a high percentage of the student population but specifically targeting at-risk populations. Academic coaches and resource teachers played a significant role in the high school instructional programs. As described in the program design documents, the roles of these academic coaches included not only working with small groups of students and coaching teachers, but were also expanded in order to provide targeted professional development opportunities and to facilitate data analysis.

As seen in the table above, the Blue Panel allocated a much higher levels of resources to create smaller class sizes, offer more electives to keep students engaged and facilitate smaller learning communities. In addition, this panel also allocated more academic coaches, technical consultants and other support personnel to achieve the desired outcomes. These increases in personnel are the main factors behind the differences in per-pupil costs between the two panels.

Exhibit 3-4 - Suggested Breakdown of Expenditures for High School Base Model Programs developed by Professional Judgment Panels				
	<i>Blue Panel</i>		<i>Gold Panel</i>	
Resources	Per-pupil Cost	Proportion	Per-pupil Cost	Proportion
Instructional Personnel	\$6,103	0.66	\$4,905	0.70
Instructional and Pupil Support	\$1,181	0.13	\$545	0.08
Administrative and Support	\$616	0.07	\$550	0.08
Maintenance and Operations	\$53	0.01	\$289	0.04
Non-Personnel Expenditures	\$947	0.10	\$536	0.08
Extended Day Program	\$165	0.02	\$79	0.01
Extended Year Program	\$219	0.02	\$131	0.02
Total	\$9,285	1.00	\$7,035	1.00

Preschool and Early Childhood Education Programs

Both panels saw the need for preschool and early childhood education programs, but panels differed in their belief surrounding the extent to which these programs should be offered in the base model elementary school. While the Blue Panel specified pegged the percent of three and four year olds to be offered early childhood and preschool programs to the incidence of poverty and special education (57% and 10%, respectively), the Gold Panel noted that 75% of the eligible three and four year old student population should be served by both programs.

Panels were not asked to specify the specific resources to be used in these programs. Instead, the AIR research team used current research³³ to determine the per-pupil cost of providing adequate quality preschool and early childhood education programs for eligible students.

Modifications in Instructional Programs for Variations in Poverty

For school prototypes with lower levels of poverty, the panels did not make major modifications to their program designs or resource specifications. When probed about the reasoning behind maintaining current levels of resources despite a decrease in student need, panelists noted that there were still a substantial number of students in poverty even among the schools in the lower 10th percentile. Additionally, panelists noted that the average outcome proficiency values for the lower poverty schools were still significantly lower than the target levels outlined in the goals statement thus justifying the resource needs reflected in the low poverty model. In turn, most changes occurred in the number of students targeted through after-school, preschool and early childhood education programs. Minor reductions also occurred in the number of support personnel (such as social workers) and general instructional personnel.

³³ The cost of \$6,274 per student was derived from a 2004 figure considered adequate by the 2006 “Preschool for All: Estimated the Cost in California” report, funded by the Packard Foundation.

For school prototypes with higher levels of poverty, the panels made substantial modifications to their base instructional design and resource specifications. Both panels specified smaller class sizes and additional support personnel such as guidance counselors, social workers and psychologists to address student needs. Panels also increased the number of students targeted through after-school, preschool and early childhood education programs. One panel drew on current research and personal experience to determine that within high poverty schools, poor attendance was a factor that kept students from achieving at high proficiency levels. To address the root cause of this problem, one panel identified the need for either a full service or partnership with a health clinic, an attendance outreach program, an improved nutritional component and additional non-personnel expenditures for hygiene supplies such as a washer/dryer and shower. In addition, the panels cited that in high poverty schools, discipline and lack of teacher experience tended to be problematic. To rectify this situation, additional administrators, resource teachers, and academic coaches were added to provide teacher support.

Modifications in Instructional Programs for Variations in English Learners

Similar to the trends for school prototypes with lower levels of poverty, panels did not make major modifications to their program designs or resource specifications when adjusting for lower levels of English Learners. Panelists reported that they incorporated English Language Development (ELD) strategies in the base model under the pretense that these strategies are beneficial to all students, not just ELs. With lower levels of ELs, panelists explained that this instructional focus on ELD remained. In addition, predicted proficiency levels for schools with low poverty and low numbers of ELs were still lower than the desired outcome levels, again justifying the need for additional resources.

For schools with higher levels of ELs, panelists made several modifications to the originally designed high poverty program. Both panels increased the number of bilingual and ELD teachers and aides to either assist current teachers or teach core subject classes. In addition, one panel specified the need to have an elementary level bilingual program whose exact orientation (i.e. – dual immersion, early exit bilingual, etc.) would be determined by the community. Additional funds for EL specific curriculum, technology, software and supplies were also allocated by the panelists. In addition, it was requested that support personnel such as administrators, clerical staff and a parent liaison have experience with English learner populations and have bilingual capabilities.

Modifications in Instructional Programs for Variations in Students Receiving Special Education Services

Both panels were aligned in their philosophies surrounding the extent to which special education students should be served in neighborhood schools and the types of services that these students should be provided. In general, panels expressed the desire to maintain the least restrictive environment possible and serve the maximum number of students possible at the school level. One panel stated that all students identified as having mild to moderate disabilities should be served at neighborhood schools. In addition, certain students with moderate to severe disabilities would also be served in

schools within the neighborhood. With this philosophy in mind, panels noted that the appropriateness of receiving services at the neighborhood school versus at the district level should be determined on a case by case basis.

In addition, both panels were aligned in the types of services that special education students should receive. Regardless of school size, panelists always designated at least one special day class with at least one full-time aide. In addition, special education instructional aides were assigned to assist full-time personnel. To meet the needs of special education students, school psychologists, social workers, nurses and counselors were all assigned at the school level.

When modifying the base instructional program in response to changing levels of special education students, there were several noteworthy observations. In schools with lower percentages of special education students, the sub-panels decided only to reduce the number of special day class teachers, aides, and on-site resource specialists. The amount of money designated for specialized equipment and the aforementioned support personnel remained constant. In schools with increased percentages of special education students, sub-panels not only increased special day class teachers, aides, and on-site resource specialists, they also increased the number of support personnel such as speech therapists and allocated additional monies for specialized equipment and materials.

Special Education Specific District Level Trends

As mentioned above, neither sub-panel had the opportunity to address special education specific district-level programs. While panelists did not feel that they had either sufficient time or information to specify resources at the district level, they did note directions that they felt the overall district programs should take. These findings are articulated in greater detail below. As this is a significant component of determining overall adequate funding levels, we recommend that further analysis of district-level special education expenditures would need to be conducted.

While both sub-panels noted that they felt the district would be better equipped to address the needs of special education students not served in the neighborhood schools, those requiring related services not already specified in school-level instructional programs, and three and four year old students requiring preschool programs, they also felt that the district programs should be further tailored to address the needs of other special education students. One sub-panel stated that they felt the district program should also include specific programs for autistic students, those aged 18 to 22 and other populations requiring specialized settings and services.

The second sub-panel had the opportunity to further expand on this line of thought. The panelists indicated that while they felt the neighborhood schools are the best place to serve special education students, it was more efficient for the district to take responsibility for planning and providing services for certain populations. In addition to providing services for autistic students (identical to the suggestion provided by the other sub-panel), the second sub-panel also noted that they felt the district would be better equipped to provide for the needs for deaf and hard of hearing, blind and visually

impaired, severe multiple disability and emotionally disturbed students. In addition, the sub-panel noted that the district should address the needs of infants, group home students and alternative education settings. Finally, this panel expressed the need for the centralization of certain special education services such as support for appropriate special education professional development and due process hearings.

Modifications in Instructional Programs for Variations in School Size

In general, panels made modifications in their instructional program designs and resource specifications directly proportional to the adjusted size. However, panelists made several changes that did not follow this overall trend. For example, one panel decided to eliminate almost all administrative personnel, save the principal, for very small schools (i.e. – schools at the 10th percentile) while the other decided that other pupil support services for students with specific needs (i.e. – second language learners) would be best provided at the regional level. In addition, one panel allocated additional professional development monies for teachers in smaller middle and high schools since they determined that these teachers would be teaching more than one subject.

The most noteworthy change regarding the variation in school size occurred in the middle and high schools in which one of the panels had already established small learning communities for their base model schools. For the task sequence addressing very small and small elementary, middle and high schools, panelists noted that since these schools were already operating as smaller learning communities by nature, that originally allocated personnel were not needed in order to create these communities. In light of these decisions, the traditional economies of scale trends do not bear out in the resulting expenditure projections.

Summary

The program provisions resulting from the PJP meeting call for bolstered education spending in many districts, and for the state overall. The panel members deliberated carefully over what would be needed to meet the high educational outcome standards that have been adopted by the state. As mentioned, this section was a mere synopsis of the thought and depth that the panels put into the program design and resource specifications. Panelists took great care to allocate both personnel and non-personnel expenditures in a way that they felt were the most effective and efficient manner in order to meet the outcome goals.³⁴

It is the judgment of the AIR team that neither panel had sufficient time to address fully the issues of multiple non-English languages served by EL programs, varying disability compositions among special education students, and varying school sizes. Moreover, neither of the panels had sufficient time at the end of the process to allow for a comprehensive review of all of the work of the special sub-panels within the context of the larger panels' work on the low- versus high-poverty school prototypes. In turn, further research would be necessary to be done on these components before these analyses could be used as a foundation for developing a school funding formula.

³⁴ Appendix E includes the complete instructional program designs offered by each panel.

Nevertheless, these patterns of resource allocation do provide some interesting insights as to the kinds of programs educators believe are necessary to achieve the results as specified in the *Goals Statement*.

Overview and Explanation of Variations

As noted in the narrative above, there were variations in the program designs and corresponding per-pupil expenditures in schools of varying size and serving different compositions of students with needs including students receiving free- and reduced-price lunch, enrolled in English language learner programs, and receiving special education services. These per-pupil expenditures include total expenditures on the school-level resources specified by each PJP excluding preschool programs (i.e., pre-kindergarten and early childhood development programs), which were treated separately.

To aggregate to total expenditures, it was first necessary to adjust teacher salaries so that they reflected the extended instructional day and year as requested by the panels. After this modification, the AIR team multiplied the full-time equivalencies of personnel by the average compensation levels for the various categories of school personnel included in the school prototypes. The total personnel costs were then added to the total of the non-personnel costs for instructional supplies, materials, equipment, professional development and student activities to determine total per-pupil expenditures.

From these per-pupil expenditures, two separate equations for each schooling level (i.e., elementary, middle and high) were constructed showing the patterns of variation in the dollar value of the sets of specified personnel and non-personnel resources across the various PJP exercises.³⁵ Both initial equations exhibited a positive slope with respect to poverty, English learners and special education students. However, because there was a much steeper slope in the per-pupil expenditure profile for schools with poverty levels above the median levels, the AIR research team generated two spline-specific slope coefficients for poverty corresponding to schools above and below the median poverty level. In addition, since the permutations in poverty and English language levels in the school prototypes were correlated, an interaction effect between these two student needs was factored into the final equations. Exhibits 3-5 and 3-6 display the resulting coefficients for high/low poverty schools at each of the three levels (elementary, middle and high).

³⁵ More precisely, the per-pupil expenditure associated with each column in the resource specification input worksheet (see Exhibit 2-3, above) was calculated and the variation in these figures with respect to student needs (incidence of poverty, English learners and special education) and school size was estimated using a series of linear (for English learners and special education), spline (for poverty) and quadratic (for school size) functions. Algebraic manipulation was used to collapse the system of functions into a two poverty-range specific equations with which to project adequate school-level programmatic expenditures.

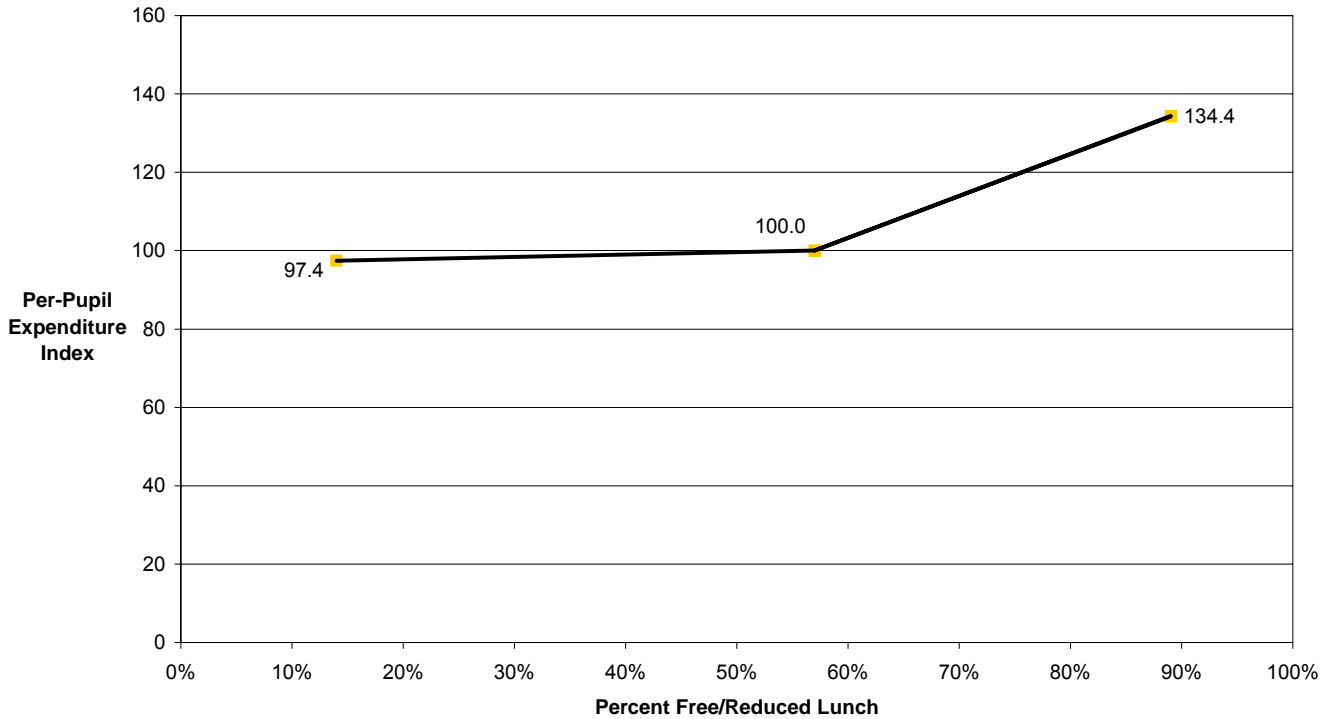
Exhibit 3-5 - Equations Derived from Blue Panel Specifications						
Elementary School	Intercept	Poverty	EL	ELxPOV	SE	Enrollment
Final Equation with Poverty Spline 1	136.07	0.26	3.48	47.81	96.45	-0.27
Final Equation with Poverty Spline 2	119.31	29.67	3.48	47.81	96.45	-0.27
Middle School						
Final Equation with Poverty Spline 1	99.28	0.28	-2.44	27.62	122.62	-0.12
Final Equation with Poverty Spline 2	84.47	29.32	-2.44	27.62	122.62	-0.12
High School						
Final Equation with Poverty Spline 1	106.92	0.14	5.01	24.24	25.63	-0.07
Final Equation with Poverty Spline 2	101.31	17.13	5.01	24.24	25.63	-0.07

Exhibit 3-6 - Equations Derived from Gold Panel Specifications						
Elementary School	Intercept	Poverty	EL	ELxPOV	SE	Enrollment
Final Equation with Poverty Spline 1	104.49	6.02	-0.53	9.72	96.25	-0.08
Final Equation with Poverty Spline 2	46.70	107.41	-0.53	9.72	96.25	-0.08
Middle School						
Final Equation with Poverty Spline 1	81.35	9.67	94.06	-76.25	128.51	-0.02
Final Equation with Poverty Spline 2	42.98	84.90	94.06	-76.25	128.51	-0.02
High School						
Final Equation with Poverty Spline 1	85.17	1.27	118.39	-120.39	92.15	-0.01
Final Equation with Poverty Spline 2	57.00	86.64	118.39	-120.39	92.15	-0.01

Example: The Resource Effects of Increases in Poverty

Exhibit 3-7 is a sample interpretation of how to interpret equation coefficients, namely for the relationship between expenditures per pupil and the percent of students receiving free- and reduced price-lunches, controlling for all other variables. As seen below, there is a positive relationship between per-pupil costs and school poverty, based on the responses of the PJPs. However, based on these specifications, it appears that poverty has a much more dramatic impact on programs in schools with high poverty levels. For example, in an elementary school at a low poverty level (i.e., at the 10th percentile with 14 percent of its students receiving free- or reduced-price lunch), expenditure would be only 2.6 percent lower than a school with average poverty (i.e. with 57 percent of its student body being free/reduced lunch eligible). However, in an elementary school at a high poverty level (i.e., at the 90th percentile with 89 percent of its student body free/reduced lunch eligible) per-pupil expenditure is 34 percent higher than a school with average poverty.

Exhibit 3-7 - Index of Per-Pupil School-Level Expenditure for Elementary School by Percent of Pupils Receiving Free/Reduced Lunch (Derived from Gold Panel Specifications)



Summary

As an example of the analysis done by the AIR team, exhibits were presented showing the variations in per-pupil program costs for elementary, middle, and high schools by enrollment and levels of student need. The results showed, all else being equal, higher per-pupil costs for schools with greater numbers of students in poverty, requiring ELL services, or eligible for special education services. The effect of poverty in schools with poverty levels above the median was especially dramatic showing a substantial influence on per-pupil costs.

The work of the PJPs involved more than just the resource specifications underlying the school program cost estimates. The collective work of the panelists offered a rich description of the programmatic elements upon which the cost estimates are based. This chapter provided a description of the nature of some of those recommendations by the panels. Smaller class sizes, enhanced availability of extended time programs, and increased access to early intervention services highlight the school prototypes developed by the PJPs. All of this was suggested in view of what would be necessary to meet the California content standards.

Chapter 4 - “Costing Out” California Adequacy: The Results

This chapter presents the projections of expenditures necessary to achieve “adequacy” in California public schools based on the program designs and resource specifications of the PJP described in Chapters 2 and 3. It then compares them to actual levels of current expenditures. The projections reflect allocations of staff and non-personnel expenditures for school operations developed by the professional judgment panels to meet the needs of various compositions of students with respect to poverty, English language learners, and students with disabilities served across elementary, middle, and high schools of varying sizes. Also added back to the school-level adequacy projected expenditures are estimates of the necessary central district level expenditures on administration, maintenance and operations, and home-to-school transportation services. Adding these additional costs at the central level permits the comparison of the projections against actual expenditures in California public schools. Finally, we have incorporated geographic adjustments for variations in the cost of recruiting and employing comparable personnel using the analysis of teacher labor markets in Rose (2006).

Projecting Adequate School-Level Programmatic Expenditures

The AIR research team used extant data to determine the actual levels of enrollment, poverty, ELL and special education for each school in the state of California. Index values were predicted for each school using the Blue and Gold panel-specific equations for each schooling- and poverty-level combination listed above in Exhibits 3-5 and 3-6, respectively. Panel-specific cost figures for each schooling-level (i.e., elementary, middle and high school) were then assigned to each school by multiplying these predicted index values by the appropriate panel/schooling-level base cost per-pupil expenditures (listed above in Exhibit 3-1). For each panel, the overall programmatic per-pupil cost for each school was then determined as the weighted combination (average) of the predicted per-pupil costs across the three schooling levels, where the weights reflected the enrollment shares within each level-specific grade range.

Accounting for District-Level Functions

For comparative purposes, the data on actual total current expenditure on public school children in California are based on information provided by the CDE for the 2004-2005 school year.³⁶ The figures reflect spending on the kindergarten through 12th grade (K-12) instructional program along with expenditures on pre-school programs provided by public schools in the state.

Current statewide spending figures for California are compared with PJP estimates of the costs of resources necessary (1) for all students to access instructional programs consistent with the California content standards and (2) the opportunity to achieve

³⁶ Specifically, we made use of Standardized Account Code Structure (SACS) fiscal data, for which 2004-05 is the latest available year.

proficiency standards established by the California State Board of Education. To maintain an accurate point of comparison, these expenditures also include projected spending on the K-12 instructional programs plus expenditures on preschool programs and early childhood education programs that the PJPs deemed necessary to achieve adequacy in California public schools.

By design, district-level expenditures were outside the scope of the school prototypes developed by the PJPs. As one of the ultimate goals was to compare these results with current levels of spending in California, the next step in the process for developing the full cost model was to obtain an estimate of those functions and activities that were excluded from the PJP deliberations.

Because of the special complexities involved in determining district administration, maintenance and operations, and transportation services, this study did not attempt to determine “adequate” levels for these components of educational expenditure directly. Rather, we utilized extant fiscal data provided by the CDE to determine “adequate” allocations for these three functions across districts in order to permit comparisons of total projected to actual expenditures. As mentioned above, adequacy projected resource specifications dictated by the PJPs focused on allocations at the school level for instruction, support, and administration. The discussion that follows provides some details about how adequate expenditure levels on district-level functions were estimated and then added back to the expenditures derived from the school prototypes developed by the PJPs. This final calculation allowed us to compare the costs of adequacy with actual current expenditures.³⁷

The main district-level components that were not included in the PJP deliberations were central administrative expenditures, maintenance and operations, and home-to-school transportation. Each of these district-level expenditure components defined as follows:

- **Central administrative functions** – Items included in this category are expenditures on the board of education, chief administration, general support staff, personnel and business functions, other special items, curriculum development and supervision, research planning and evaluation, and community service.
- **Maintenance and operations** – This category includes building maintenance and operations, the central storeroom, central processing and administration of these functions.
- **Transportation** – This includes all home-to-school transportation services provided to students.

For central administrative and maintenance and operations functions, we used two alternative approaches which are described below. However, for the purposes of this study we made no attempt to estimate any changes in the costs of home-to-school

³⁷ For the purpose of comparison, the analysis conducted by AIR excluded debt service associated with the acquisition of land and construction of school facilities, as these elements of expenditure were beyond the scope of this project.

transportation. Instead, existing expenditures on transportation services were simply added to our school level cost projections.

The Lump-Sum Approach

This first method, which is referred to as the *lump-sum* approach for short, simply added back actual amounts expended in the 2004-05 school year in each district for these components. That is, the amount of current district expenditures on central administrative functions and maintenance and operations services are added back on top of the projected school program expenditures deemed necessary to achieve adequacy. Clearly, this approach yields conservative lower-bound estimates of adequate funding levels for central administration and maintenance and operations, as it does not account for any possible changes in expenditures in these district-level functions to support any expansion in instructional program suggested by the PJP specifications.

The Overhead Ratio Approach

In reality, changes in the size of the instructional program are likely to impact both costs of central administration and maintenance and operations services. As school level costs of instructional and related services expand, the need for programmatic supervision, personnel services, business functions, and other planning functions are likely to expand. In addition, if additional staff is required to deliver the instructional program ultimately additional classroom and other instructional space would be necessary to support these programs. It follows that maintenance and operations services would also expand accordingly.

With this notion in mind, we need to apply an approach that allows these district level functions to change proportionately with changes in the school level instructional program. Using data from the Standardized Account Code Structure (SACS) fiscal file, the AIR team calculated district-level overhead ratios for the centralized district administration and maintenance and operations services. That is, we estimated for every district in the state the amount of spending on central administration and maintenance and operations generated for every dollar of spending on instructional and related services at the school site. We refer to these values as *overhead ratios*.

These *overhead* ratios were then applied to the projected spending on the school-level instructional and related services programs derived from the PJP specifications. Applying this overhead ratio implies that these centralized functions will grow proportionately with changes in the school level instructional programs. This overhead ratio approach should be viewed as an upper bound on the potential change in expenditures on these district-level functions.

Reality Lies Somewhere In-Between

In reality, there are likely elements of both central administrative functions and maintenance and operations services that might not change in proportion to changes in the instructional program. For example, one might imagine that the cost of school board

operations and the superintendent’s offices might remain relatively constant with changes in school level spending. In turn, reality likely falls somewhere in between the *lump-sum* and the *overhead ratio* estimates. In the results that follow, we have presented mean values of these two approaches in our cost projections. While this may have some intuitive appeal, we admittedly have no empirical evidence on which to determine how accurate such an approach might be. Further research on this issue is beyond the scope of the present project and should be considered in future applications of this analysis.

District Level Special Education Expenditures

The PJP specifications assumed that all but a handful of special education students were to be served in neighborhood schools. However it was recognized that there may be some residual district-level responsibility for ensuring an adequate program for special education students. Specifically, there were three additional categories that need to be accounted for in this analysis: the additional costs of special education preschool programs, programs for severely disabled students requiring special schools, and very specialized related services for students with disabilities not commonly provided by school level personnel.

The original plan was to have the PJPs designate the resources required to provide for these district-level special education programs. Unfortunately, due to time constraints and the belief that more detailed information surrounding exact district circumstances would be needed in order to address this issue, the PJPs were not able to generate the specifications for these district-level special education resources.

To estimate these costs, the AIR team imputed the district level special education expenditures. For this imputation, we used a combination of actual information on district level special education personnel serving California school districts combined with information developed as part of the New York Adequacy Study (Chambers et al, 2004) to estimate costs for non-certified personnel and non-personnel resources for which data were unavailable for California school districts. We recognize that the expenditure estimates for district-level special education spending are rough approximations, however, they represented a very small percentage of total projected costs (less than one percent of the total projected costs).

Adjusting Projected Costs in Each School for Geographic Cost Differences

Districts in different parts of the state operate in different labor markets. To adjust our cost projections for geographic variations in the cost of school personnel, we incorporated a comparable wage index (CWI) based on a study conducted for the “Getting Down to Facts” Project (see Rose, 2006).³⁸ The index provides a geographical adjustment for the difference in *cost of recruiting and employing comparable personnel across various regional labor markets across the state*. The labor markets are defined across the 30 metropolitan statistical area regions in the state. Only the personnel share of the adequacy projected expenditures was adjusted by the CWI.³⁹

The Cost of an Adequate Education – Results

The initial adequacy cost estimates presented below reflect the resource specifications of the PJPs combined with the estimated expenditures of the district level functions as described above. These findings represent the culmination of the professional judgment process as applied in this study with an account of the main district-level expenditures and adjustments for geographic variations in wage costs.

Adequate Per-pupil Cost Estimates by Locale Type

Exhibit 4-2 compares the AIR projected per-pupil expenditures derived from the program specifications designed by the Blue and Gold PJPs to the actual per-pupil expenditures reported in the SACS fiscal files supplied by the CDE.⁴⁰ These figures are pupil-weighted so that they represent per-pupil expenditures for the district attended by the average student within each of four district categories. In addition to the overall statewide average, average per-pupil expenditures within different types of districts provided. The district categories include urban, suburban, towns and rural districts based on the locale codes used by the National Center for Education Statistics (NCES) and published in their Common Core of Data (CCD). Specifically, the eight NCES locale codes have been combined into four locale categories as follows: Urban contains large and small cities (codes 1 and 2); Suburban includes urban fringe of large and mid-size cities (codes 3 and 4); Towns contain large and small towns (codes 5 and 6); and, Rural includes rural areas (codes 7 and 8).

³⁸ For the purposes of this study, we modified the index by applying pupil-weighting, which effectively re-centered the index such that 100 denotes the region attended by the average student.

³⁹ Although the price of non-personnel inputs also varies across geographic location, we have made no effort to similarly adjust these types of expenditures. While the variation in non-personnel input prices and wages across regions may be closely related, the former make up a much smaller share of total educational expenditures and therefore have not been adjusted accordingly.

⁴⁰ It is understood that both projected and actual (current) expenditures refer to 2004-05 dollars, which corresponds to the year of the most recent SACS fiscal data available for use in this study.

Exhibit 4-1 – Categorization of NCES Locale Code Definitions		
Locale Category	NCES Locale Code	NCES Locale Code Definition
Urban	1	Large City - A central city of Consolidated Metropolitan Statistical Area (CMSA) with the city having a population greater than or equal to 250,000.
	2	Mid-size City - A central city of a CMSA or Metropolitan Statistical Area (MSA), with the city having a population less than 250,000.
Suburban	3	Urban Fringe of Large City - Any incorporated place, Census Designated Place, or non-place territory within a CMSA or MSA of a Large City and defined as urban by the Census Bureau.
	4	Urban Fringe of Mid-size City - Any incorporated place, Census Designated Place, or non-place territory within a CMSA or MSA of a Mid-size City and defined as urban by the Census Bureau.
Towns	5	Large Town - An incorporated place or Census Designated Place with a population greater than or equal to 25,000 and located outside a CMSA or MSA.
	6	Small Town - An incorporated place or Census Designated Place with a population less than 25,000 and greater than 2,500 and located outside a CMSA or MSA.
Rural	7	Rural, outside MSA - Any incorporated place, Census Designated Place, or non-place territory designated as rural by the Census Bureau.
	8	Rural, inside MSA - Any incorporated place, Census Designated Place, or non-place territory within a CMSA or MSA of a Large or Mid-Size City and defined as rural by the Census Bureau.

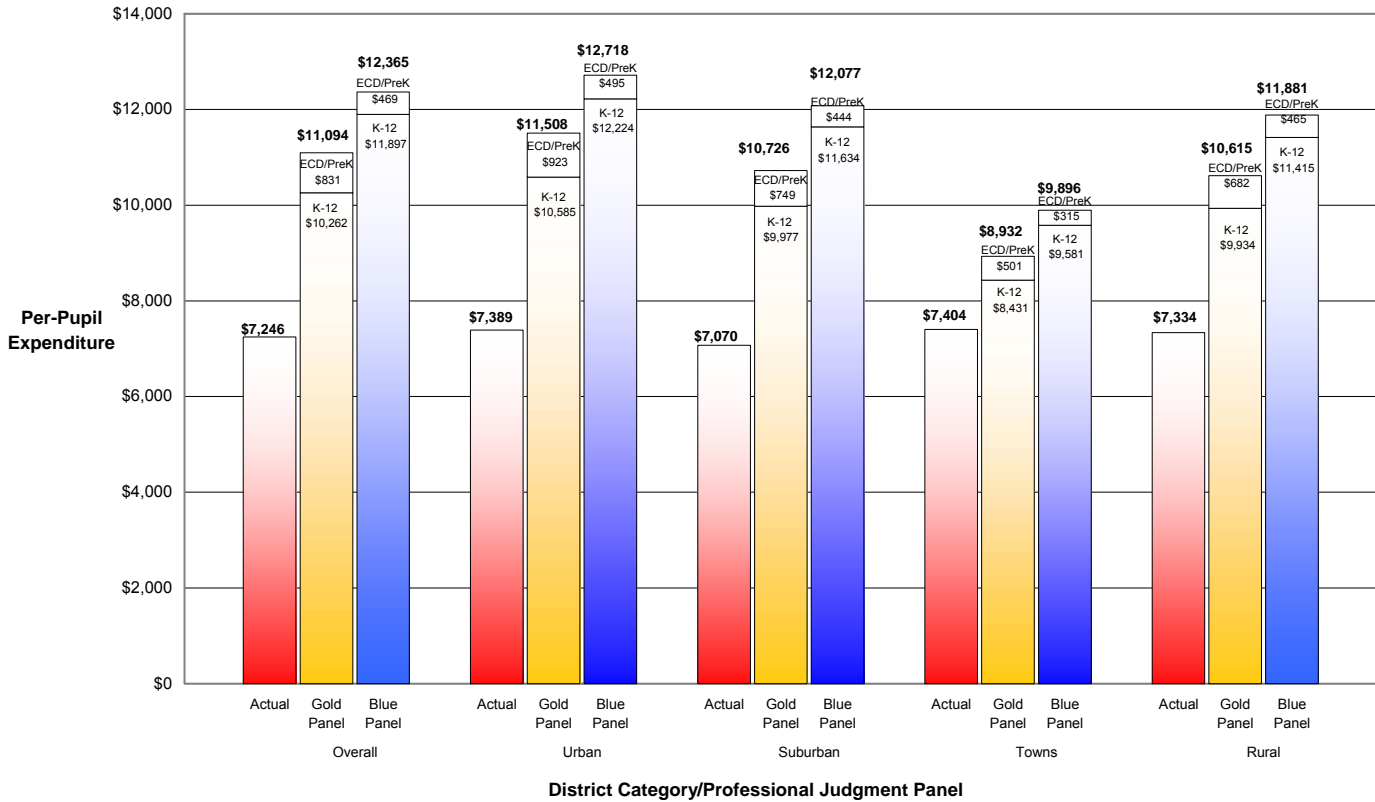
In the exhibit there are five clusters of stacked bars that denote average per-pupil expenditure across the state as a whole and within each of the district categories defined above. Each cluster contains three stacked bars corresponding to actual 2004-05 per-pupil expenditure, in addition to the projected adequate expenditure based on the Blue and Gold Professional Judgment Panels, respectively. We have split up each of the bars corresponding to the adequacy-projected expenditures into two sections denoting the portions attributable to resources specified for early childhood development (ECD)/PreK and K-12 programs, respectively.

It should be noted that the chart includes per-pupil expenditures that have been calculated using K-12 enrollment for the 2004-05 school year as the denominator.⁴¹ It is important to understand the use of spending *per K-12 pupil*, as all references to per-pupil expenditure that follow, *including those spent on preschool programs that include a significant amount of projected ECD/PreK enrollment*, follow this convention.⁴²

⁴¹ The study made use of enrollment figures from the 2004-05 California Basic Education Data System (CBEDS) file, available at the California Department of Education (CDE) website <http://www.cde.ca.gov/ds/sd/cb/studentdatafiles.asp>.

⁴² This is not to say that preschoolers should not be considered individual learners. However, introducing a projected per-pupil expenditure based on the total projected PreK-12 enrollment will necessarily produce a lower figure (due to the addition of significant projected ECD/PreK enrollment in the denominator of the calculation, each of which adds below-average spending in the numerator), downwardly biasing the estimated projected increase in per-pupil spending. Moreover, the authors felt that while the actual

Exhibit 4-2 - Comparison of Adequate Versus Actual Per Pupil Expenditures by District Type and Professional Judgment Panel (Overall Expenditure on PreK and K-12 in Bold)



To this end, the projected increases in per-pupil spending attributable to PreK programs is simply the additional expenditure for each enrolled K-12 student to support these program costs. The exhibit shows that the statewide average “adequate” per-pupil expenditures for the 2004-05 school year range from \$11,094 to \$12,365, which represents a 53 to 71 percent increase over what was actually spent that year (\$7,246). However, it is important to recognize that the figures show large variation across the four district categories defined above.

The results suggest that students in urban districts require the highest per-pupil expenditure (from \$11,508 to \$12,718) to provide an adequate education, while necessary per-pupil expenditures are lowest for districts that lie in towns (\$8,932 to \$9,896). Nevertheless, it must be noted that the suggested ranges of adequate per-pupil expenditures for both district types are well above what was actually spent. The implied increase in per-pupil expenditure that is required for urban districts to achieve adequacy ranges from \$4,119 to \$5,120, while for town districts this range is \$1,528 to \$2,492.

expenditures derived from the SACS data includes some spending on ECD/PreK programs, the bulk of the calculated actual spending is in grades K-12.

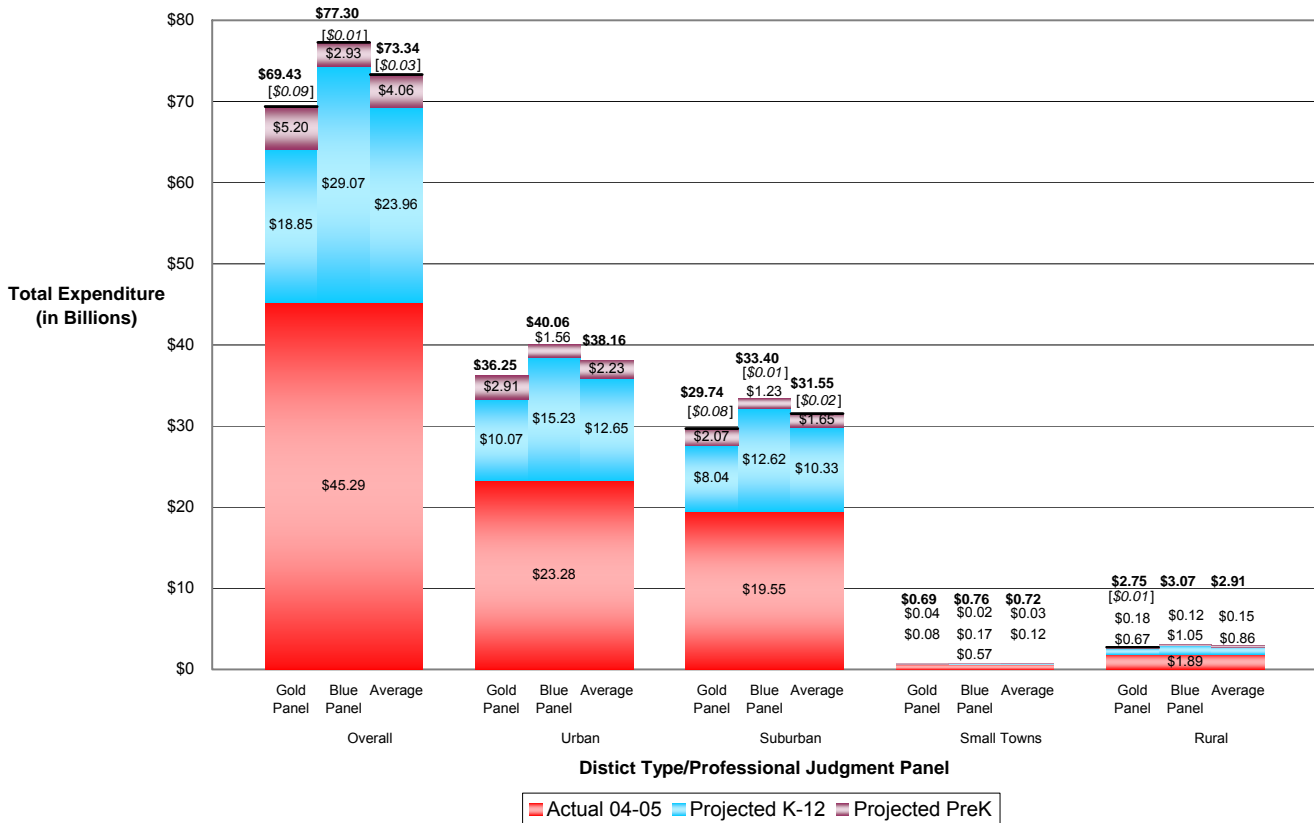
Total Costs Required to Bring Districts to “Adequate” Spending Levels

Exhibit 4-3 presents a stacked bar chart that shows how actual total current expenditures in California compare to total projected costs, based on the AIR analysis, necessary to provide all districts with “adequate” levels of spending. Similar to the previous chart, this exhibit provides five clusters of bars corresponding to the state as whole and the four district locale categories. Each cluster contains bars describing the total 2004-05 expenditure and the marginal increases necessary to provide an adequate education as projected by the costed-out Blue and Gold Professional Judgment Panel resource specifications. In addition, we have also included an additional bar to each cluster that contains the average of the Blue and Gold Professional Judgment Panel projections. The bottom portion of each bar displays the actual total current spending by California public schools by locale category. The upper portions display the total incremental expenditure necessary to provide adequate spending levels in each district broken out by ECD/PreK and K-12 components.

It is important to recognize that the sum of these three components (Actual, ECD/PreK and K-12) figures represent the *exact* amount it would take for districts to provide an adequate education as projected by our model. As will be seen below, a small number of (mostly suburban) districts are currently spending at or above these levels and there is little reason the projections should penalize them for choosing to do so. We therefore calculate neutral bottom-line “hold-harmless” expenditures. That is, we provide an estimate of total expenditures from all sources (federal, state and local) necessary to bring all districts spending less than is deemed “adequate” up to the adequacy projected levels of spending, with no change in current levels of spending for those districts at or above “adequate.” For those districts already spending at adequate levels, we simply preserved their actual spending levels rather than substitute them with the lower expenditures projected by the model. The hold-harmless figures are reported in bold at the top of each bar, while the marginal increases denoting the total amount of above-adequate spending across districts is included in brackets.

The results show that spending for the state would have to grow between \$24.14 and \$32.01 billion above the current 2004-05 level of \$45.29 billion (or between 54 and 71%) in order to ensure that every district is funded at levels capable of providing an adequate education to all its students. Obviously the expenditure shortfall varies greatly by type of district. The total additional expenditure required to bring all Urban districts up to adequate spending levels is highest in absolute and relative terms equaling \$13.0 to \$16.8 billion or a 56 and 72 percent increase above current expenditures, respectively. Suburban districts would need between \$10.2 and \$13.9 billion representing a 52 to 71 percent increase. Districts lying in locales categorized as Rural would need an additional \$0.9 to \$1.2 billion (increases of 45 to 62 percent, respectively). Finally, Small Towns districts would need to up their expenditures by a total of \$0.1 to \$0.2 billion or 21 to 34 percent in order to provide an adequate education.

Exhibit 4-3 - Total Expenditure Required to Provide "Adequate" Levels of Spending by District Type and Professional Judgment Panel Specification (Total Expenditure in Bold, Hold Harmless in Brackets)



Adjustments Required to Ensure All Districts Have Adequate Resources

Clearly, the numbers of school districts spending less than their projected adequacy levels differed between the Blue and Gold Panels. Exhibit 4-4 presents the number of districts identified by each panel as spending above/below the levels deemed adequate by the PJPs. The chart contains two bars corresponding to counts of districts spending above/below adequate levels as determined by the Blue and Gold Panel total projected expenditures in the previous exhibit, as well as a third based on the between panel average. Each bar in the chart is broken into three sections denoting the following: the number of districts currently spending less than is necessary to provide an adequate K-12 educational program; the number of districts spending enough to deliver an adequate K-12 program, but less than is required to support an adequate preschool program; and the number of districts that are spending enough to provide adequate schooling programs for both K-12 and preschool students. As seen in the exhibit, there are a very small number of districts spending at or above the projected K-12 adequacy levels (only 21 to 43 out of the 984 total districts included in the analysis) and even fewer (5 to 15) that spend at levels that will also support an adequate preschool program. To bring these districts up to projected spending levels without redistributing revenues from other sources, districts would require an additional \$24.14 billion (see Exhibit 4-3) according to the Gold Panel

specifications and an additional \$32.01 billion using those of the Blue Panel. While these numbers call for dramatic increases in funding, it is important to put these results in the context of the educational goals to which the panelists were responding. The goals statement put to the PJP is based on standards set by the California State Board of Education, which have been rated amongst the highest in the nation by the latest (2006) annual report Quality Counts. For instance, an evaluation of standards by the Fordham Foundation states:

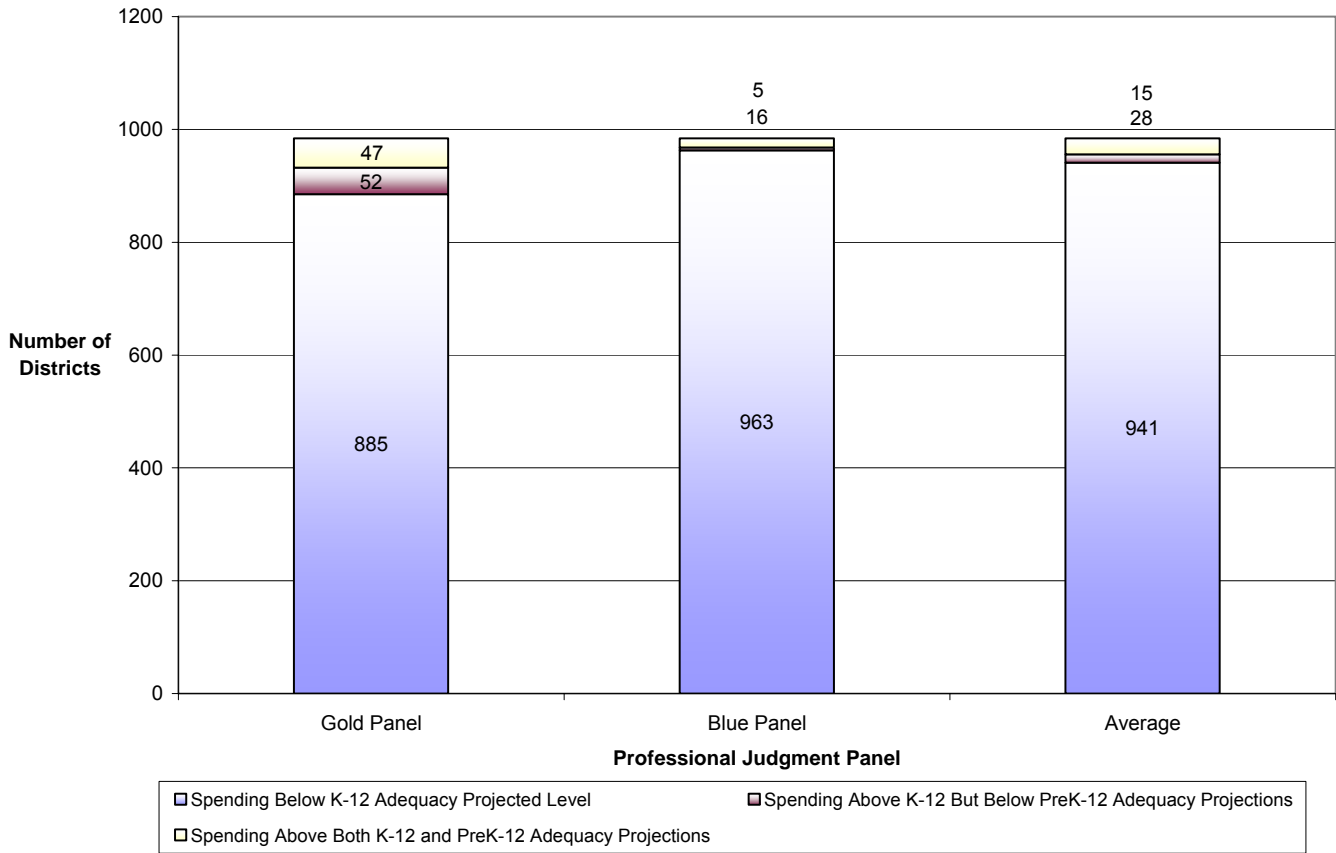
“. . . evaluators rated California standards as the best in the nation.” (page 10, Rose et al, 2003).

In addition, a recent study ranked the rigor of state assessment standards and assigned an overall grade of B- to California (see Peterson and Hess, (2006)). Finally, the latest Education Week report Quality Counts (2006) gave California an overall rating of B+ (score equals 89) for its standards and accountability, however, for standards and school accountability separately it received scores of 40 (out of 40) and 27 (out of 30) points, respectively.⁴³ The panelists also noted that there were significant gains needing to be realized between current and targeted achievement levels.

In light of the high standards California sets for its public education system and the current level of educational achievement in the state, the large adequacy-projected dollar figures may not be all that surprising. The main point suggested by these results is that we must be realistic about the demands we place on our public education system and weigh these against our willingness and ability to pay for them.

⁴³ Unfortunately, the overall standards and accountability rating suffered because the state does not offer elementary social studies assessments that are aligned with state standards.

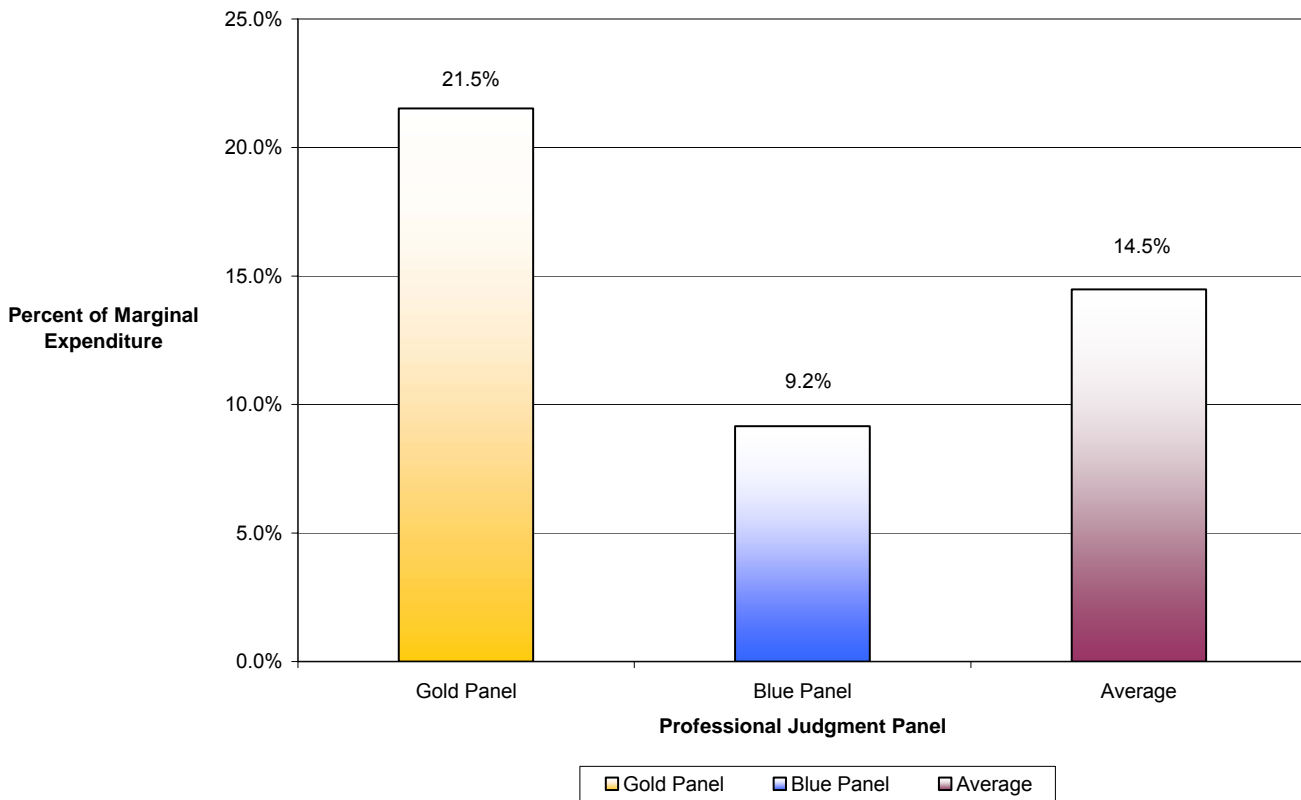
Exhibit 4-4 - Number of Districts Spending Above/Below K-12 and PreK-12 Adequacy Projected Levels



The Role of Preschool

As previously indicated, preschool programs consisting of both early childhood development (ECD) programs for three-year olds and pre-kindergarten (PreK) for four-year olds are included in the estimates for the total costs of adequacy. Exhibit 4-5 shows the proportion of the total incremental costs of achieving adequacy based on projected preschool expenditures as directed by the PJPs in their deliberations. The Blue Panel specifications allocated resources for ECD/PreK that equaled 9.2 percent of the total incremental costs of providing an adequate education, while the Gold Panel specifications allocated over 20 percent of the incremental costs for these same programs. As indicated in Chapter 3, both panels specified additional services directed for the most part to students living in poverty, though the Gold Panel indicated a greater need for ECD than did the Blue Panel.

Exhibit 4-5 - Projected Preschool Expenditures as Percent of Additional Required Expenditure by Simulation Model



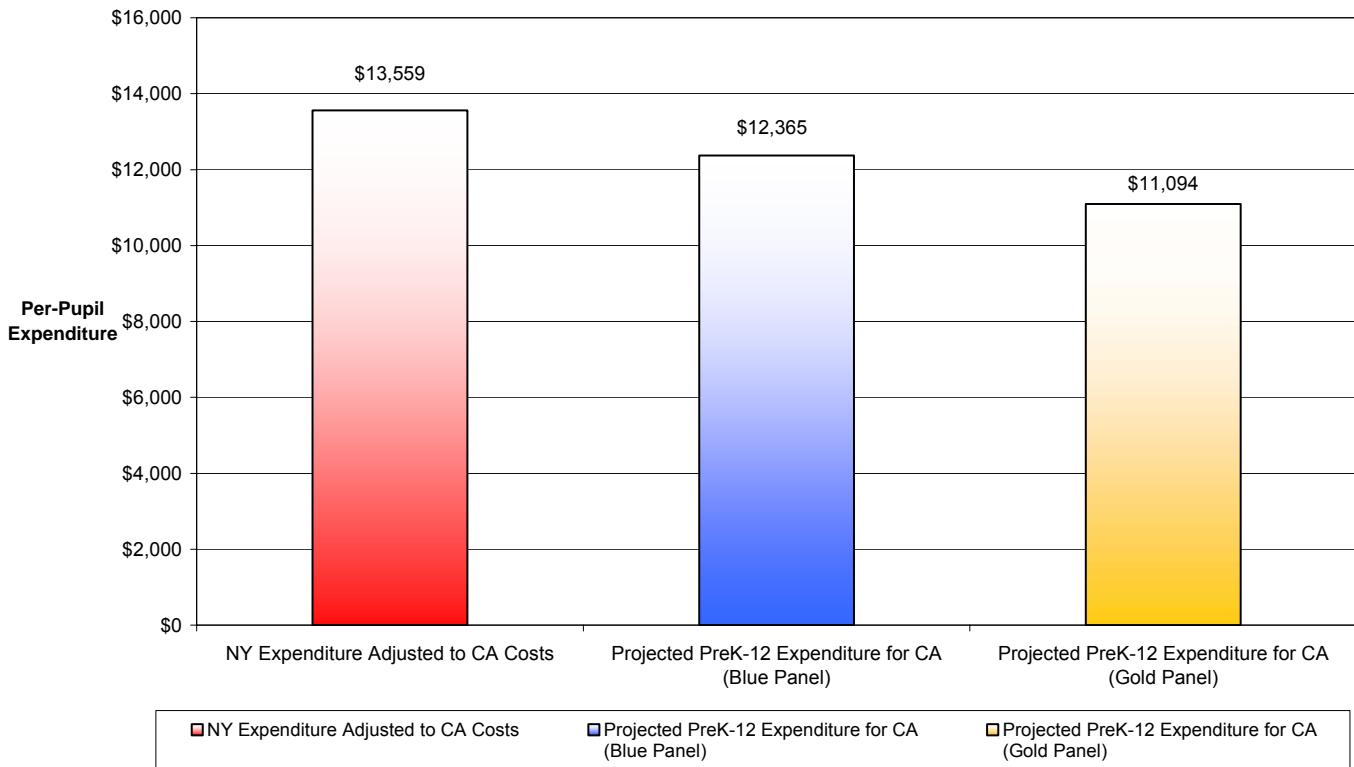
A Comparison with New York

At first glance, the projected costs for California seem extraordinary. However, if one takes into account the condition of California school finance for the past couple of decades and its current position when considering the question of school finance adequacy, these projections may not seem so far out of line. Recent data published by the Census Bureau show that actual California school spending ranks 25th, but when adjusted for geographic cost differences across the U.S., California ranks 44th among the 50 states in per-pupil spending on education.⁴⁴ In fiscal year 2003, New York State spent \$12,140 per pupil in comparison to actual spending in California of \$7,691.

⁴⁴ See Table 8 in Public Education Finances, 2003 (<http://ftp2.census.gov/govs/school/03f33pub.pdf>) published by the Census Bureau in 2005 and <http://www.bcnys.org/whatsnew/2005/0317schoolspond.htm>. Please note that the actual figure for California presented here (\$7,691) is slightly higher than that used elsewhere in this report (\$7,246), which excludes debt service and facilities construction (see footnote 13, above). To obtain the cost adjusted spending, we used the comparable wage index developed by Dr. Lori Taylor for the National Center for Education Statistics and adjusted actual spending for the variations in labor costs across the states.

However, even more significant is a comparison of these projections in Exhibit 4-2 against comparable projections with a similar study conducted by Chambers et al (2004) in New York State. Exhibit 4-6 presents this comparison. The New York figure represents the average per-pupil expenditure necessary to provide an adequate education in New York State school districts. The figures presented in this exhibit for New York have been adjusted for inflation (to 2004-05 dollars) using the Employment Cost Index for education personnel from the U.S. Bureau of Labor Statistics combined with a rough adjustment to account for geographic differences in the cost of education between New York and California taken from Taylor (2006). The projected per pupil spending figure for New York State (\$13,559) represents a 17 percent increase over actual average per-pupil expenditure for New York State which is already a relatively high spending state.⁴⁵

Exhibit 4-6 - Comparison of Projected Per-Pupil Expenditures from New York and California Adequacy Studies



⁴⁵ Exhibit 4-1 (p. 74) of the final report for the New York Adequacy study (see Chambers et al, 2004) shows a projected per pupil expenditure for 2001-02 of \$12,975 which is 17.4 percent higher than the actual per pupil spending of \$11,056 for the same year. The \$13,559 figure presented in Exhibit 4-6 in the body of this report represents the inflation adjusted estimate of the original projection for New York State of \$12,975. Adjusting the \$11,056 for inflation, the actual per pupil spending in New York for the 2004-05 school year would have been \$11,554.

While the California cost projections appear high relative to current spending levels in California, they are still lower than the projections for achieving adequacy in New York State. Indeed, the New York projections are about 10 to 22 percent higher than those for the California Blue and Gold panels, respectively. In fact, the higher of the two California projections is just above the actual public school spending per pupil in New York State for the 2002-03 school year which amounted to \$12,140. While such comparisons can be criticized on a number of grounds, they do provide a somewhat different benchmark against which to judge the work of the California PJPs. The outcome standard used by the PJPs in New York was that “all students have a full opportunity to meet the Regents Learning Standards and to earn a Regents Diploma” (see Chambers et al, 2004, page 17, Exhibit 2-1). In this study, the PJPs were asked to develop their projections based on the California content and proficiency standards which have been argued by some to be comparable to, if not more rigorous than, that of New York.⁴⁶

While comparing the results stemming from the California and New York studies may evoke a sense of “keeping up with the neighbors”, this is not the intention of the exercise. The comparison is an attempt to place the results of this study in context by comparing real (adequacy projected) spending in California against other states in the nation. Because these kinds of professional judgment studies, like all costing-out work, require projecting spending beyond the sample of experience of most educators, it is worth providing some benchmarks against which the results may be compared. In this case, we have compared two states with somewhat similar levels of rigor in their content and performance standards and the program designs and resource specifications of two entirely independent panels. We believe these kinds of benchmarks help policy makers decide for themselves whether these kinds of studies provide a valuable basis upon which to build approaches to determining how schools should be funded.

One must also recognize that the two states, while similar in the number of districts and degree of urbanicity, also exhibit some differences that may have implications for expected education cost differences. New York serves a total student population of about three million across approximately 700 school districts, while California serves more than 6 million children across almost 1,000 school districts. The average district in New York serves about 4,000 students while the average district in California serves about 6,000 students. New York State is, of course, dominated by New York City which serves more than one out of every three students in the state. California’s largest urban school district

⁴⁶ For instance, the reports by McLaughlin et al (forthcoming) shows that California’s reading and math achievement standards for 4th and 8th graders lie between the National Assessment for Educational Progress (NAEP) basic and proficient levels, and are generally higher than the corresponding grade-level/subject standards for New York (the exception being 8th grade reading). The Fordham Foundation evaluated the quality of state standards and their “evaluators rated California standards as the best in the nation.” (p. 10, Rose et al, 2003). Peterson and Hess ranked the rigor of state assessment standards and assigned an overall grade of B- to California and C for New York (see Peterson and Hess, (2006)). The latest Education Week report Quality Counts (2006) gave California an overall rating of B+ (score equals 89) for its standards and accountability, however, for the standards and school accountability it received scores of 40 (out of 40) and 27 (out of 30) points, respectively. Unfortunately, the overall standards and accountability rating suffered because the state does not offer elementary social studies assessments that are aligned with state standards.

is Los Angeles, which is the second largest district in the country, but serves just under 12 percent of the population of the state.

About 20 percent of students live in families whose incomes are below the poverty line in New York versus about 22 percent in California.⁴⁷ Moreover, about 17 percent of the students in California are English learners, while in New York less than 2 percent of students are classified as such. Finally, about 15 percent of the students in New York are identified as eligible for special education services, while in California this number is closer to 11 percent.⁴⁸ The poverty and EL numbers would suggest somewhat higher costs for California schools, while the later special education enrollment numbers might suggest somewhat lower costs.

Nevertheless, the analysis does provide a useful perspective against which to compare California spending, actual and projected, on public schools. The cost estimates for achieving adequacy in California schools based on our analysis are not only lower than the projections for adequate per pupil spending in New York State, but they are lower than even current levels of spending in New York.

The Needs-Scale Index

The analysis carried out in this report was primarily designed to develop an estimate of the cost of an adequate education for all California public schools given the configurations of size, pupil needs and teacher markets within which they operate. This section analyzes the patterns of variation in pupil needs and the scale of school and district operations, and it presents a summary of these patterns through what we refer to as a Needs-Scale Index.

Developing the Needs-Scale Index

Four critical pieces of data are used to separate these cost components:

- (1) Implicit geographic cost of education index (IGCEI)
- (2) Base per-pupil expenditure level (BASE_EXP)
- (3) Needs index (NEED)
- (4) Scale index (SCALE)

Two numbers are required to calculate each of these components: the projected per-pupil expenditure levels (PROJ_EXP) and the standardized projected per-pupil expenditure levels (STD_EXP) that do not take into account geographic cost variations. The following formulas are used to calculate each of the four critical numbers:

(eq. 1) $IGCEI_i = PROJ_EXP_i / STD_EXP_i$.

⁴⁷ For a comparison of New York and California on poverty and other characteristics of student populations see http://www.edsource.org/pdf/DemogrfcsEdFact_Final.pdf.

⁴⁸ See the NCES Digest of Education Statistics, Tables 35 and 52 to obtain data on total enrollment and total special education enrollment in California and New York. <http://nces.ed.gov/programs/digest/d05/lt2.asp#7>.

The *Implicit Geographic Cost Index* (IGCEI) for district i is defined as the ratio of the projected per-pupil expenditure for district i to the standardized projected per-pupil expenditure for district i .⁴⁹ The reader is reminded that projected per-pupil expenditures reflect variations in the cost of providing adequate educational services across districts in California, and it includes the variations in scale, pupil needs, and the costs of comparable school personnel. The standardized projected per-pupil expenditures include variations for scale and pupil needs, but do not reflect any geographic variations in personnel costs. Thus, the only difference in costs between the numerator and denominator are the geographic variations in costs of school personnel. Equation (1) extracts that component in the form of the IGCEI.

The base per-pupil expenditure level is calculated by taking the pupil-weighted average of the standardized projected expenditures:

$$(eq. 2) \quad \text{BASE_EXP}_i = \sum_{i=1}^I w_i \times \text{STD_EXP}_i$$

where w_i is the pupil-weight (i.e., the proportion of overall state enrollment in district i).⁵⁰

Finally, the Need-Scale Index for district i is calculated as follows:

$$(eq. 3) \quad \text{NEEDSCALE}_i = \text{STD_EXP}_i / \text{BASE_EXP}$$

That is, the Needs-Scale Index is simply the ratio of the standardized projected per-pupil expenditure to the pupil-weighted average per-pupil expenditure. It reflects variations in projected costs associated with scale of school and district operations and the composition of pupil needs.

Based on this collection of formulas, it can be shown that, for any given district i , the projected per-pupil expenditure can be calculated as the product of the base per-pupil expenditure (i.e., the pupil-weighted average of the standardized projected per-pupil expenditure for all districts), the district-specific IGCEI, and Needs-Scale Index:

$$(eq. 4) \quad \text{PROJ_EXP}(i) = \text{BASE_EXP} \times \text{IGCEI}(i) \times \text{NEEDSCALE}(i)$$

Appendix G details the descriptive statistics for the Needs/Scale Index. By construction, the pupil-weighted index is centered around 100. However, the index is quite spread out ranging from a minimum value of 64.7 to a maximum of 344.7.

⁴⁹ Remember that the average compensation rates in the standardized model reflect the compensation paid to school personnel in the districts attended by the average student (i.e., they are pupil-weighted average compensation rates).

⁵⁰ If ENR_i = district enrollment, then

$$w_i = \text{ENR}_i / \sum_{i=1}^I \text{ENR}_i$$

Variations in the Needs-Scale Index

It is important to recognize that one of the components implicit in the Needs-Scale Index is the inclusion of actual data on spending to reflect district-level functions.⁵¹ Thus, using the Needs-Scale Index could potentially create incentives for districts to inflate spending on district-level functions since actual data are used in one form or another. Avoiding this incentive would require a multivariate regression approach that includes factors reflecting the components of the Needs-Scale Index and generates a predicted value. To understand these patterns of variation, the AIR team has used multivariate regression analysis to sort out the variations in the index using the following variables to estimate a model capable of yielding a predicted Needs-Scale Index:

Need Variables

- Percent of students eligible for free- and reduced-price lunch
- Percent of students classified as English learners
- Percent of students enrolled in special education
- An indicator denoting elementary school districts

Scale Variables

- Natural logarithm of district size in various functional forms

Often linear and squared terms are used for enrollment to reflect the curvilinear relationship between spending and district size. The analysis initially followed that convention. However, rather than relying solely on the results where a functional form is imposed via estimation of a quadratic or some higher order polynomial, the relationship between the Needs-Scale Index and district enrollment was ultimately estimated with separate enrollment category-specific equations. To this end, district enrollment was broken into five categories: Very Small (less than 1,003), Small (between 1,003 and 5,000); Medium (between 5,001 and 10,000), Large (between 10,001 and 20,000) and Very Large (greater than 20,000). Furthermore, Chow tests were conducted to assess whether the estimated effects of the independent variables were equivalent across the different enrollment category specific regressions. Exhibit 4-7 suggests that jointly the estimated effects do not differ between Medium, Large and Very Large districts. Moreover, the results suggest that the estimated coefficients significantly differ between Very Small districts and those in all other categories, and between Small and Large districts.⁵² In turn, in what follows we report three enrollment-specific regressions for Very Small, Small and the pool of Medium, Large and Very Large districts, respectively.

⁵¹ Whether the projections use the lump-sum, overhead ratio, or their average to calculate spending on district-level functions, these figures still represent values that vary by district.

⁵² Interestingly enough, the results suggest that the regression coefficients also do not differ significantly between the Small and Very Large districts and, to a lesser extent, between the Small and Medium districts. While the lack of difference between Small and Very Large districts is rather strange, the authors felt that the

Exhibit 4-7 – Pairwise Chow Tests of Equality of Coefficients Across Enrollment Category Specific Needs-Scale Index Regressions				
District Enrollment Category	Very Small (Less than 1,003)	Small (Between 1,003 and 5000)	Medium (Between 5,001 and 10,000)	Large (Between 10,001 and 20,000)
Small (Between 1,003 and 5,000)	40.849 (0.00)			
Medium (Between 5,001 and 10,000)	22.907 (0.00)	1.614 (0.15)		
Large (Between 10,001 and 20,000)	15.722 (0.00)	2.321 (0.04)	0.754 (0.58)	
Very Large (Greater than 20,000)	25.257 (0.00)	0.911 (0.47)	0.485 (0.79)	0.734 (0.60)
F-statistics with p-values in parentheses. $F_{crit(5, 924, 0.05)}=2.22$.				

Exhibit 4-8 contains the main results from the regression analysis. The first column of the exhibit corresponds to the regression results for districts classified as Very Small. The log enrollment coefficient of -0.133 suggests that for every 10 percent increase in enrollment, relative adequate per-pupil expenditure (relative to the district attended by the average student) is expected to decrease by 1.33 percent. The scale effect in the second column for Small districts is more subdued, where a 10 percent increase in enrollment is only expected to decrease relative per-pupil expenditures by about one-fifth of a percent. For Medium, Large and Very Large districts the scale effect is negligible in magnitude and statistically indistinguishable from 0.

To put this finding in perspective, it is informative to think in terms of standardized effects; the effect of a one standard deviation or 0.68 percent increase in enrollment corresponds to a 0.09 percent or 0.507 standard deviation decrease in relative adequate expenditure. Exhibit 4-9 contains the calculated effect sizes that correspond to the regression results.⁵³ The point estimate is less than one-sixth the size for Small districts (-0.21) translating into an effect size of -0.072, and virtually non-existent for districts classified as Medium, Large or Very Large.

⁵³ Please refer to Appendix G for the descriptive statistics of the variables contained in the regression analysis that were used to generate the effect sizes in Exhibit 4-9.

Exhibit 4-8 - Regressions of Needs-Scale Index by Enrollment Category			
Variable	District Enrollment Category		
	Very Small (Less than 1,003)	Small (Between 1,003 and 5,000)	Medium, Large and Very Large (Greater than 5,000)
Natural Logarithm of District Enrollment	-0.133 (18.41) ^{***}	-0.021 (2.27) ^{**}	0.005 (1.02)
Free/Reduced Lunch Percentage	0.301 (10.87) ^{***} [0.351]	0.226 (9.05) ^{***} [0.254]	0.256 (9.96) ^{***} [0.292]
English Learner Percentage	0.261 (6.71) ^{***} [0.298]	0.260 (8.61) ^{***} [0.297]	0.213 (4.19) ^{***} [0.237]
Special Education Percentage	0.879 (6.88) ^{***} [1.408]	0.560 (3.26) ^{***} [0.751]	0.242 (1.24) [0.274]
Elementary District Indicator	-0.070 (3.77) ^{***} [-0.068]	0.007 (0.93) [0.007]	0.026 (1.86) [*] [0.026]
Constant	0.634 (12.69) ^{***}	-0.060 (0.78)	-0.266 (5.42) ^{***}
Observations	406	295	283
Adjusted R-squared	0.6960	0.6925	0.6698
Dependent variable is $\ln(\text{Needs-Scale Index}/100)$. Precise percent changes calculated using the transformation $(\exp(\beta)-1)$ appear in brackets. Robust t statistics in parentheses.			
* significant at 10%; ** significant at 5%; *** significant at 1%			

Because the three need variables (Free/Reduced Lunch, English Learner and Special Education percentages) are entered in the regressions as absolute values (i.e., not logarithms) the corresponding coefficients have been transformed to provide effects in their precise percentage term equivalents (in brackets). Student poverty shows highly significant effects for districts at all enrollment levels, however, for the smallest districts the effect of student poverty is slightly higher than for the other two categories. The estimated percentage effect of 0.351 found for Very Small districts suggests that for every 10 *percentage point* increase in students enrolled in free- or reduced-lunch, there is an expected 3.5 percent relative increase in adequacy projected per-pupil expenditure. This translates to an effect size of 0.467. While the point estimates are similar, although slightly lower, for the other (larger) district size categories, the estimated effect sizes increase to 0.516 and 0.554 for Large and Very Large districts, respectively.

The incidence of English learners also has a highly significant effect that tends to be constant across Very Small and Small districts. The point estimate translates into a percentage effect of 0.298 and 0.297 for Very Small and Small districts, respectively, while for districts that are Medium or larger it measures 0.237. The corresponding effect sizes are 0.316 (Very Small), 0.393 (Small) and 0.285 (Medium, Large and Very Large).

Perhaps the most interesting finding resulting from this analysis stems from the estimated effect of special education on relative projected adequate per-pupil expenditures. Here we find the incidence of special education students has a profound impact on the expenditures deemed necessary to provide an adequate education in Very Small districts. The percentage translated coefficient of 1.408 indicates that a 10 percentage point increase in the number of special education students is expected to boost the required per-pupil expenditure by 14.1 percent, translating into an estimated effect size of 0.224. For Small districts, there is also a large percent effect of 0.751, which yields a 0.115 effect size. However, Medium, Large and Very Large districts experience a much smaller effect that is indistinguishable from 0.

Finally, the effect of being an Elementary district only affects those Very Small districts, where the expected per-pupil expenditure is 6.8 percent lower than the Very Small district attended by the average student.

Examining the results in Exhibit 4-9 helps sum up the regression results. The findings show that relative per-pupil expenditure is most sensitive to enrollment in Very Small districts. The percent of students eligible for free or reduced price lunch has the most prominent effect on expenditure across all districts, but is felt strongest in Medium, Large and Very Large districts. The incidence of English learners puts a similar pressure on expenditures across all districts, regardless of size, but its effect is strongest in Small districts. The percent of students identified as special education has the strongest effect on Very Small districts and decreases with increases in district size. Finally, Elementary school districts that are categorized as Very Small tend to exhibit lower per-pupil expenditures.

Exhibit 4-9 – Estimated Effect Sizes of Needs and Scale Dimensions on Need/Scale Index			
Variable	District Enrollment Category		
	Very Small (Less than 1,003)	Small (Between 1,003 and 5,000)	Medium, Large and Very Large (Greater than 5,000)
Natural Logarithm of District Enrollment	-0.507	-0.072	0.066
Percent Free/Reduced Lunch	0.467	0.516	0.554
Percent English Learners	0.316	0.393	0.285
Percent Special Education	0.224	0.115	0.037
Elementary District Indicator	-0.170	0.029	0.085
Largest effect sizes in absolute terms in bold.			

Separating the Needs and Scale Components

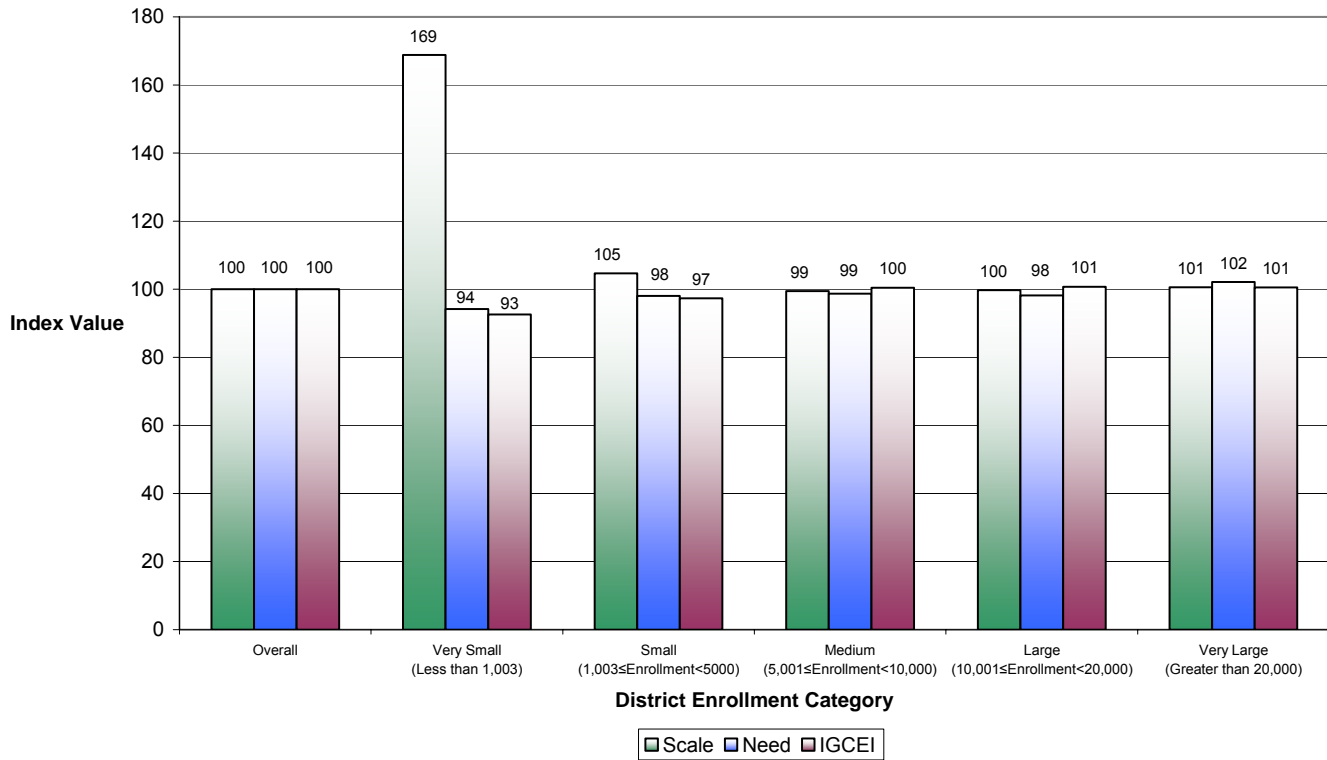
Using the estimated regressions, it is relatively simple and informative to separate the Needs-Scale Index into its two components: one reflecting pupil need and the other reflecting the impact of scale. That is, while the Needs-Scale Index reflects both

components, each may show different patterns of variation across districts. To facilitate this analysis we calculate the separate Needs Index component by predicting values from the estimated equations using only the need dimensions (i.e., controlling for scale). Similarly, the Scale Index component is obtained by calculating predicted values using only the scale variable (i.e., controlling for pupil needs). Exhibits 4-10, 4-11 and 4-12 show how geographic cost variations, the scale of district operations, and differences in pupil need all play distinct roles in accounting for variations in the estimated cost of achieving adequacy.

Exhibit 4-10 illustrates the pattern of variation in projected adequate expenditure into three separate components: a Scale Index (i.e., reflecting district size), a Needs Index (i.e., an index of pupil need), and the Implicit Geographic Cost of Education Index or IGCEI (i.e., reflecting the impact of personnel cost differences on the projected expenditures). The mean value for each of these indices (i.e., the IGCEI, the Scale Index, and the Needs Index) is scaled so that the value 100 represents the pupil-weighted average value. An index value of 110 reflects a district that is 10% above the statewide (pupil-weighted) average, while a value of 90 represents a district that is 10% below the statewide (pupil-weighted) average on the respective index.

Upon examining these numbers, several noteworthy trends emerge. Analysis of the variations in the patterns of the Scale Index suggest that diseconomies of scale play a dramatic role in the level of adequate per-pupil expenditures for Very Small districts, and to a lesser extent, Small districts. The component of adequate per-pupil expenditure attributable to the scale factor for the Very Small district attended by the average pupil is 69 percent higher than the pupil-weighted statewide average. This figure falls to 5 percent for Small districts and then levels off for larger districts. With respect to the Needs Index, Very Large districts exhibit slightly higher than average projected per-pupil expenditures based on pupil needs (i.e., the Needs Index equals 102), while Small, Medium and Large districts have relatively lower adequacy-projected per-pupil expenditures due to their needs (Needs Index values of 98, 99 and 98, respectively). The expected adequacy determined per-pupil expenditure attributable to student needs for Very Small districts is significantly lower (approximately 6 percent lower) than the statewide pupil-weighted average.

Exhibit 4-10 - Implicit Geographic Cost of Education (GCEI) and Relative Needs/Scale Indices by District Enrollment Category



At first glance, it would seem that there is very little overall variation in the Needs Index. However, it is important to realize that Exhibit 4-10 only charts the pupil-weighted averages within each of the district enrollment categories. Exhibit 4-11 isolates the Needs Index and shows its mean and range across the five classifications of enrollment. Here we see that the index varies considerably within each enrollment category. That is, across all sizes there seem to be districts that face relatively higher and lower needs that will tend to drive the necessary per-pupil expenditures above/below the statewide average. It is interesting to note that the range of needs amongst the Small and Medium and Large and Very Large districts are quite similar, respectively. Small and Medium district index values range from 81 to 128, whereas, those of Large and Very Large districts range from 83 to 120. Very Small districts exhibit a considerably wider range of needs component index values for (70 to 129). That is, these smaller districts include both those with the highest and lowest relative needs across the state. Holding the costs of school inputs and scale of operations constant, the highest need districts would require more than 84% (equal to $[(129/70)-1]$) higher expenditures than the lowest need districts to achieve adequacy.⁵⁴

⁵⁴ The reader should recall that need reflects variations in the proportion of pupils living in poverty, who are English language learners, or who are eligible for special education services.

Exhibit 4-11 - Spread of Needs Component Index Overall and by Enrollment Category

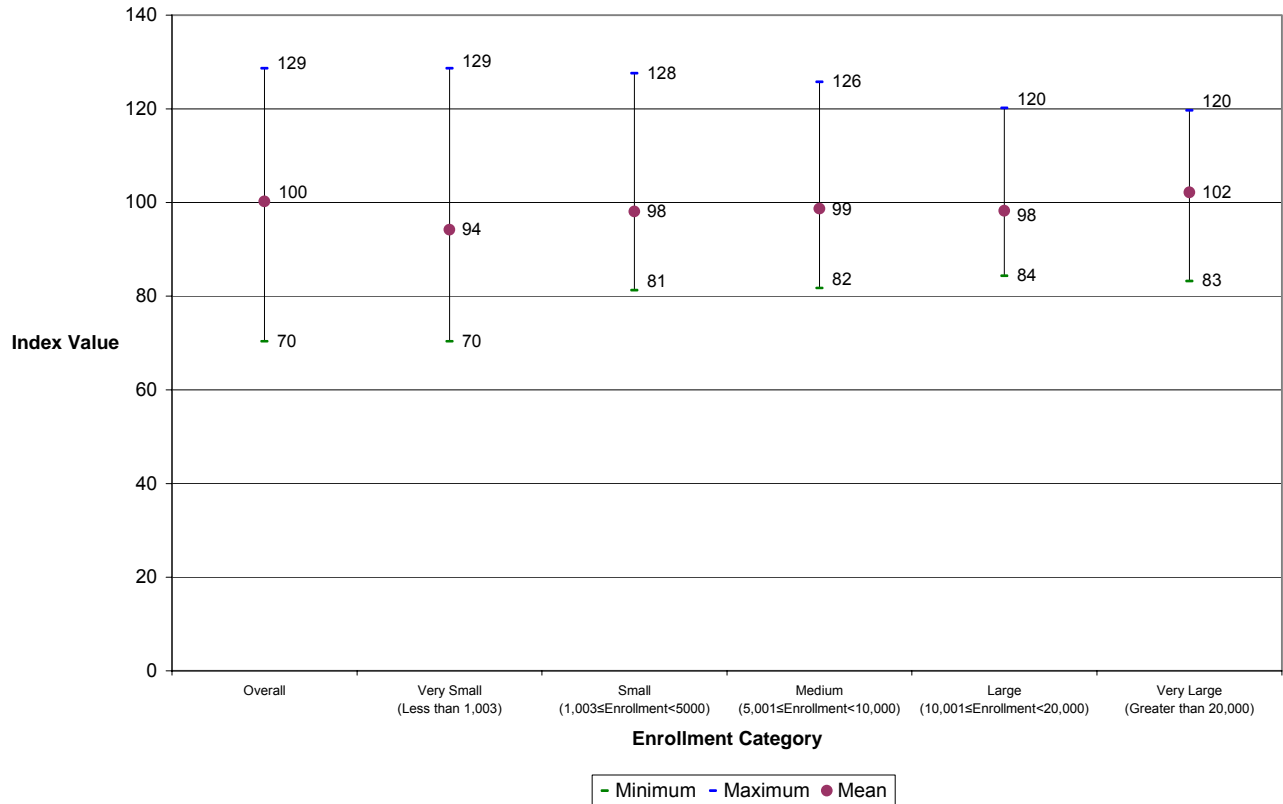
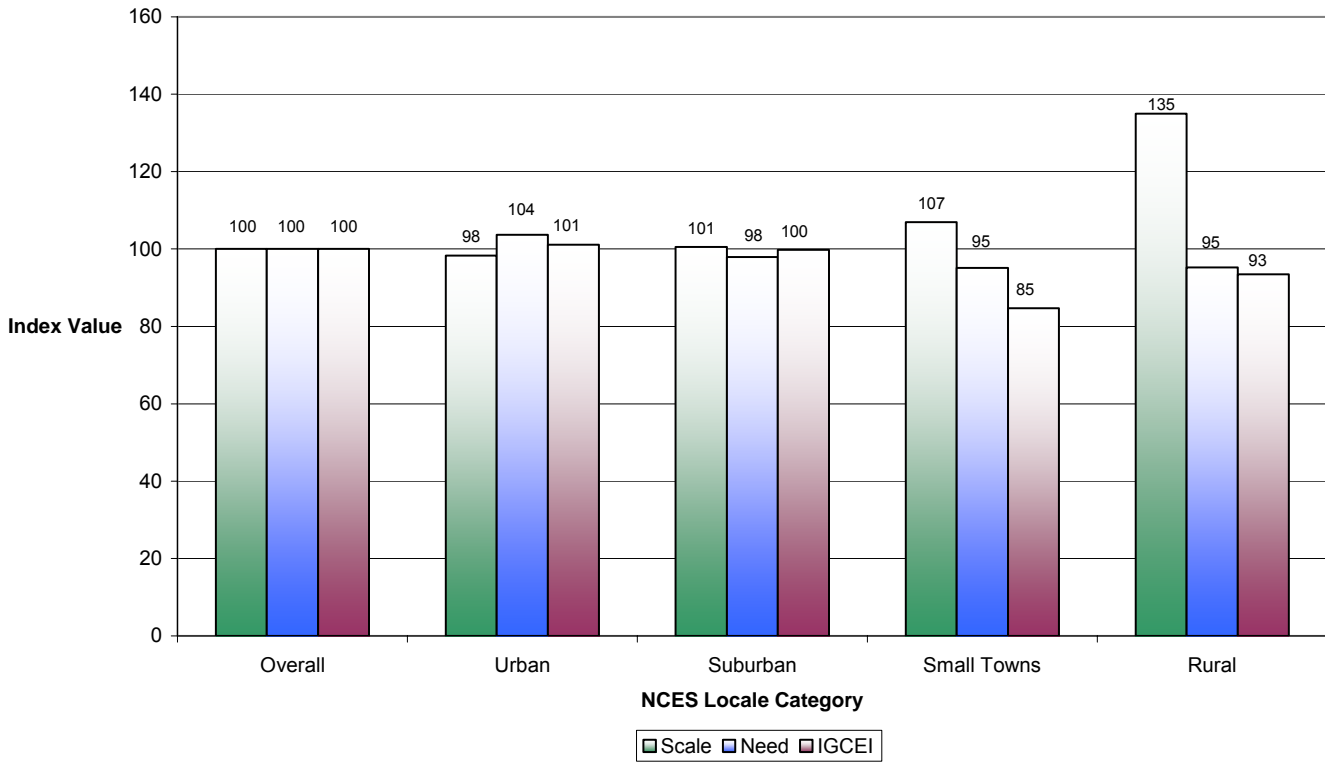


Exhibit 4-12 shows how the individual Needs, Scale and Implicit GCEI vary with respect to district locale. Analysis of the variations in the patterns of scale and need revealed that the urban districts tended to exhibit relatively higher projected expenditures based on pupil needs and relatively lower projected expenditures associated with scale of operations, all else equal. Also note that there is a consistent pattern of higher relative costs associated with the scale more rural districts and, to a lesser extent, small towns that are consistent with diseconomies of scale these districts often face due to small enrollments.

Exhibit 4-12 - Implicit Geographic Cost of Education (GCEI) and Relative Needs/Scale Indices by NCES Locale Category



Using the Needs/Scale Index Over Time

For the most part, the Needs-Scale Index reflects variations in district size, the percentage of students in poverty, ELL and special education. Major changes from one year to the next in these characteristics are unusual. Moreover, the index as calculated in this study is not a precise calculation. Rather, it is intended to reflect major differences across districts in the relative needs of the students served and the effects of district size.

With this in mind, one could consider simply using the predicted Needs-Scale Index itself as a constant for the immediate future. That is, one could simply assign a value of the index to each district and retain that value for a period of three to five years. Changes in allocations to the district over time would be impacted only by inflation, measures of which would be applied to the base expenditure level.

Every three to five years, an adequacy study should be updated with new Needs-Scale Index numbers. Subsequent studies could include updated analyses of teacher costs and meetings of a select group of educators to review the standards and resource specifications upon which the current estimates are built.

An advantage to using the Needs-Scale Index rather than a pupil-weighted system is that it is simpler in concept and reduces the incentives for districts to increase enrollments of selected populations (e.g., special education or ELL) in order to increase funding. Moreover, marginal changes in these categories of students are not likely to have a significant impact on the actual costs of serving the students.

Chapter Summary

This chapter has presented an overview of the results of this study and an examination of the disaggregated components of the cost projections: district-level expenditures, geographic cost variations, pupil need and scale of operations. Alternative estimates of the investment required to achieve educational adequacy were presented based on the PJP specifications, which correspond to the two panels organized for this study. In addition, we have described two approaches to addressing the cost of specific district-level functions. The final method used reflected the likelihood that spending on some district-level functions would grow in proportion to projected changes in spending on instructional programs while also factoring in more conservative estimates on expenditures such as transportation costs. However, there are no data at present showing how much these central administrative, maintenance and transportation expenditures are likely to change.

Actual current expenditures on education for the 2004-05 school year measures \$45.29 billion. The projected additional dollars necessary to realize “adequate” spending throughout the state range from \$24.14 to \$32.01 billion. These figures represent substantial additional investments necessary to bring all districts that, in 2004-05, were spending less than projected levels up to a spending level that would achieve adequacy. Overall, the \$24.14 and \$32.01 billion suggested by the panel specifications as necessary to provide all public students in the state with an adequate education constitutes as, respectively, a 53 and 71 percent increase above what was currently being spent in the 2004-05 school year. While these figures are dramatic in their scale and implication, the panelists felt that given current student proficiency levels, these increases were necessary to meet the California content standards and outcome measures.

Though these figures appear to be very high when compared to current levels of school spending in California, they don’t appear to be that high when compared to projections resulting from a similar study conducted in New York State. In fact, the projections for California are actually significantly lower by between 10 and 22 percent than similar projections of the cost of an adequate education in New York State. While there are some differences between the states on a number of dimensions that might impact costs and the projections themselves, it is still interesting to note the projections for California fall short of what similar New York panels thought was necessary to achieve adequacy in school funding.

Chapter 5 – Conclusion

This chapter offers reflections resulting from seven months of defining and affixing dollars to dimensions of educational adequacy. AIR organized a cadre of highly qualified educators to develop the design and resource specifications necessary to deliver an “adequate” program of educational services. In this context, “adequacy” was defined in terms of a set of desired outcome goals and learning standards for the public school students in California. The process involved a single three-day meeting with two independent professional judgment panels and associated sub-panels to determine adequate instructional programs and resource specifications to meet the desired outcomes. The details of the professional judgment process and the results of their deliberations are presented in Chapter 2 of this report.

For the sake of transparency, this report has presented a range of “adequacy” cost estimates based on the different resource specifications by the two independent professional judgment panels selected for this project. The additional dollars required to bring those districts currently spending below “adequate” levels up to “adequacy” required anywhere from \$24.14 for the Gold Panel to \$32.01 billion for the Blue Panel, respectively. Each of these cost estimates is presented and compared in Chapter 4.

The remainder of this chapter focuses on four areas: (1) a discussion of some implementation issues, (2) additional research that would further refine these cost estimates of “adequate” educational services, (3) suggestions for using these data as a basis for education finance distribution formulas, (4) comments regarding the role of analysis in relation to the ultimate responsibility of policymakers, and (5) a concluding set of caveats.

Implementation Issues

Implementation of the “adequacy” models presented in this report implies a significant expansion of the instructional program for both school-aged as well as preschool children. In addition to bolstered K-12 programs, the “adequacy” cost models includes preschool programs for 3 and 4 year olds. In many districts, full implementation of one of these models would require hiring more school personnel. As a surplus of all these categories of needed personnel is unlikely, successful implementation would require significant planning. For example, more college students will need to be encouraged to become teachers, and the teacher training capacity of the state will need to be enhanced. In the short run, increased salaries may be needed to attract those already holding credentials but working elsewhere back into the teaching profession and to reduce turnover among those already employed as teachers. In addition, additional funding will be needed for facilities to accommodate the additional classrooms, which are not currently accounted for in the projections presented in this report.

Neither of these issues should be taken lightly as they may have both short run and long run implications for the costs of implementing the implied demands for allocating

additional resources to pre-K to 12 education in California. The short run impact could result in a decrease in the quality of the teaching force and the need to provide additional resources for capital facilities to meet the needs for additional classroom teachers. California should be quite sensitive to these factors given the experience with the *class size reduction* initiative of Governor Pete Wilson in the 1990's.⁵⁵ With this experience in mind, the estimates presented in this report should be regarded as lower bound estimates for achieving adequacy as they do not account for short run or long run impact on salaries of school personnel as a result of the additional demand nor the impact on the costs of upgrading or increasing the capacity of our school facilities.⁵⁶

Remaining Research

Central administration, facility maintenance and transportation costs account for a large proportion of spending in California schools. While it is possible to make informed estimates of these costs, they remain unverified, partially undermining the precision of any estimate of “adequacy.”

Central Office Administration and Maintenance and Operations Costs

While the direct costs of educational programs specified through the PJP process can be derived with reasonable accuracy, consideration of their impact on central administrative services was not included in this study. For example, at what juncture does the addition of new school buildings or an increase in the size of instructional staff at existing schools create a burden necessitating additional central office staff? It would be useful to explore with school business officials and other high level decision makers what additional district level resources might be necessary to implement these programs and how best to estimate these needs.

Transportation services

We made no attempt to integrate transportation costs either into the PJP deliberations or to develop more refined cost estimates of home-to-school transportation services. Further research should consider ways in which school size and transportation costs impact one another and ways in which the design of programmatic opportunities for children (e.g., magnet school programs and other choice models as well as decisions to serve special education students in neighborhood schools) impact the need for home-to-school transportation services and their costs.

Converting “Costs” of Adequacy to Funding Formulas

Chapter 4 illustrates methods for developing indices of differences in costs associated with pupil need and the scale of district operations. As an alternative to developing individual weights for various categories of pupils, the authors suggested that policy

⁵⁵ For a more complete discussion of the California experience with class size reduction, the reader should see http://www.wested.org/policy/pubs/full_text/class_size/sect1.htm.

⁵⁶ The authors are thankful to an anonymous reviewer of an earlier draft of this report for pointing this out.

makers might consider simply employing the overall indices or the bottom line expenditure estimates to provide a foundation for a distribution formula. Using this type of approach as the basis for a “foundation” school funding formula requires calculation of the implicit geographic cost of education index, an index of pupil needs, an index of scale, and a basic per-pupil dollar amount necessary to purchase the designated resources. This use of an overall set of indices reduces incentives for districts to identify more pupils at the margin for special education or English language learner services. These kind of need-scale indices could be applied for some period of time, say three to five years, after which a new study could be commissioned to update the “adequacy” specifications and to review the factors underlying the foundation formula. In the interim, the only adjustments necessary to fund education annually would be an appropriate estimate of inflation to be applied to the basic per-pupil dollar amount necessary to achieve “adequacy.”

“Costing-Out” Analytic and Policy Roles

Results presented in this report are in the form of a range of dollar figures, each based upon a specific set of procedures or assumptions. The report has concentrated on providing information regarding the analytic components of each “adequacy” determination. If policy makers in the state are dissatisfied with an assumption, then they can substitute others and determine the resulting costs. We believe that transparency is a crucial component of a “costing out” process.

“Costing out” adequate opportunity is not an exact science, but rather an ongoing process of estimation. To be sure, sophisticated analytic tools can be brought to bear upon the process, but the estimation of the costs of an “adequate” opportunity is more of a quest than an end point. Thus, it is inappropriate for courts or policy makers to seize upon any particular estimate as the only one that is worthy of being “adequate.” Instead, those who formulate policies should use discretion and take into account the range of estimates and the underlying assumptions upon which they are based before deciding on what policy action might be best.

Concluding Thoughts

Scale of operations and the distribution of special student needs (poverty, ELL, and special education) are the two major factors underlying the cost variations shown in this study. Policy makers should consider the relative weights they choose to place on each of these factors. Due to the highly integrated fashion by which each of them was treated within the model, however, they may be best suited to block grant, as opposed to categorical, funding approaches. For example, categorical funding mechanisms such as special education funding weights will not be easily derived from this approach.

Also, although the professional judgment panels derived instructional designs by which schools could construct an adequate opportunity to meet California content standards and outcomes, this theoretical design does not include, or recommend, that the specific components of these models become mandates for local practice. However insightful the instructional designs created by the California PJPs or persuasive the case for their

effectiveness, education continues to be more of an art than a science. Harnessing creativity and commitment, and taking advantage of the experience of local educators, necessitates providing them with discretion to determine exactly how funds should be used.

It is also important to recognize that California content and proficiency standards are regarded as setting a high standard of adequacy for the public schools. We presented these standards to the California PJPs prior to the deliberations, and we asked them to base the program designs and resources specifications to the extent possible on achieving these standards. Should the realities of the state's economy suggest that the kinds of investments implied by these models are more than the citizens of the state are likely to be willing to bear, then one option facing policy makers is to lower the standards to something that is within the reach and willingness of the taxpayers to support.

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